A RADIO CONTROLLED POWERED SOARER

MODEL AIRPLANE NEWS

10th Year of Publication

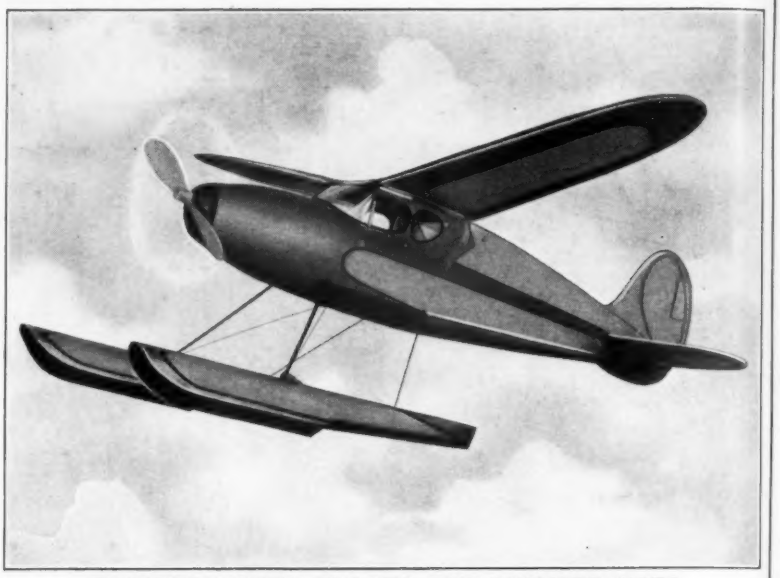
AUGUST 1938
20¢

The Seversky Trans-Oceanic
Super Clipper. (S[illegible])

The SKEETER

A SENSATIONAL FLYING ENDURANCE MODEL WITH *interchangeable* WHEELS, FLOATS and SKIS!!

"It's truly remarkable . . . just what I have always wanted . . . the answer to flying models while on vacation . . ." Fellows, it's a knockout! Thousands of satisfied model builders are sending in similar reports to us. It's the smoothest and slickest job you have ever seen. Trim and sleek lines make it a real beauty, yet it's as simple as ABC to build. The set is guaranteed absolutely complete, and here is one time you will build a model right from the set. The swell part of it is you can fly it anywhere at any time. It takes just a minute to change from wheels to floats and from floats to skis. It's adaptable for any purpose. Be another satisfied customer. Get your SKEETER today.



36" WINGSPAN
28½" LENGTH

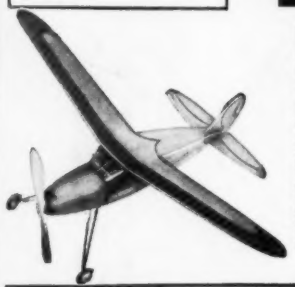
ONLY $1.00 COMPLETE POSTPAID OR AT YOUR DEALER

ADDITIONS YOU MAY LIKE

M & M wheels, per pr. 50c. This model performs best on a good grade of FRESH BROWN RUBBER. A band is furnished in the set. For extra good flying results get some special rubber, 80 ft. 40c. A saw cut prop is furnished in the set. If you like to carve your own we can furnish a ready shaped block, only 30c. For a lot of flying with floats it's best to have a good dope job. We stock fine clear and colored dope, 2 ozs. 15c, ½ pt. 40c, 1 pt. 75c.

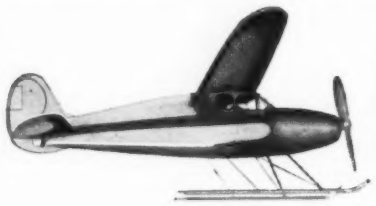
EQUIPPED WITH FLOATS FOR SUMMER USE!

Fly the SKEETER at your pet swimming spot and thrill to real outdoor sport. Watch her majestically rise from the water and feel the tingle when she comes in to a perfect landing, the floats just kissing the water. Beat the heat with this flying honey. GET IT NOW!



EQUIPPED WITH WHEELS

Snap! Just like that you change from pontoons to wheels. Wind up that powerful prop and look at her take off. Now she's climbing in a spiral bank, leveling off at the top, and then she's away to a long hop into the blue summer skies. Already wildly enthusiastic congratulatory reports are sifting in. One says . . . "It's the consistent, powerful climb that so amazes my friends. They have never seen anything like it." Another reports . . . "It's the simplest model to build that I ever got. When it flew better than anything I have made so far I was certainly sold on BURD!" Join the mob and find flying satisfaction with the SKEETER. Be wise, ORDER NOW!



EQUIPPED WITH SKIS

Prepare to fly in any kind of weather. Yes, we know it's a long way off, but this rugged flyer is made to last. When the balmy weather changes, outsmart the weather man. It takes a minute to change to skis, and there you have the pluckiest battling flying fool you have ever owned. Be the envy of the neighborhood. Get the first SKEETER in the air and listen to the oh's and ah's of your admiring friends. Get one at your dealer's NOW. If he can't supply you, write in direct, but HURRY!

NEW 16" FLYING MODELS 10c AT YOUR DEALER

These will be mailed postpaid eight for $1.00. No smaller quantities will be shipped.

JONES TRAINER

PERCIVAL GULL

TAYLORCRAFT

HELLDIVER

CAUDRON RACER

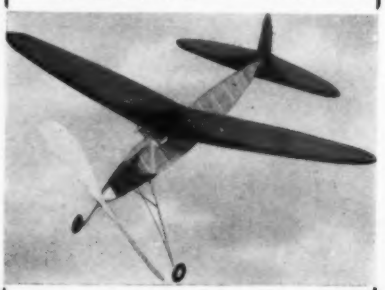
CESSNA

WACO CABIN

CLOUD-HOPPER

ENDURANCE MODELS DELUXE!!

Korda's World Record Holder 43" Wingspan, Complete ..... only $1.00



30" THERMALIDER—The Model That Set New Standards of Value 50c

GAS MOTORS

Brown Model D		$10.00
Brown Model M		15.00
Brown Model C		17.00
Brown Model B		21.50
Syncro-Ace		13.75
Ohlsson		18.50
Brat		16.50
Condor		18.50
Syncro Bee		12.50
Trojan		18.50
Intermote		16.50
Mighty Midget Upright		
finished	$9.50	kit $7.85
Mighty Midget Inverted		
finished	9.75	kit 7.85
Gwin Aero Upright		
finished	12.00	kit 9.85
Gwin Aero Inverted		
finished	12.50	kit 9.85
Mighty Marine		
finished	12.50	kit 10.85

DEALERS!!

Don't let profits trickle through your fingers. Here's a hot summer item in the SKEETER. Why not sell your customer what he wants? Write or wire for our proposition today.

BURD MODEL AIRPLANE CO.

101-105 W. Pratt St. Baltimore, Md.

In England: Elite Model Planes, 14 Bury New Road, Manchester
In Sweden: Sven Wentzel, 84 Apelbergsgaten, Stockholm
In South Africa: Model Aircraft Pty., 23 Dock Rd., Capetown
In Australia: K Dee Mnfg., 113b Bathurst, Sydney

Get Acquainted with AVIATION!

Keep in touch with this live-wire sport—MODEL AVIATION. You can build and fly the finest model airplanes. Operate your own home workshop just like this modeler shown at left. Get acquainted with the latest and best by reading

MODEL AIRPLANE NEWS

★ **FUN**—Know about the latest model flyers. Get a real kick from watching *your* ship soar high above, and glide home for a perfect three-point landing.

★ **LEARN**—to build racers—cabin planes—big transports—fighters—bombers. Know about wing-stresses—lifting—dihedral—whirlwind motors. Study the gas jobs powered with tiny 1/5 H.P. motors—own your own that will fly 25 minutes.

★ **MAKE MONEY**—Win prizes in model building and in model flying. Make scale models to sell for home decorations . . . flying models for gifts, etc.

★ **POSSIBLE CAREER**—It pays to keep up with AVIATION, the world's fastest-growing business! A thorough knowledge will help if you decide on aviation as a career. There's big money for flyers, mechanics, technical experts and executives.

THIS OFFER EXPIRES AUGUST 8TH

FINAL OFFER—Send in Your Subscription Today!

FREE

With each 12-month subscription we are giving a kit to build a flying model of the new redesigned 1938 Taylor Cub. The model of this famous airplane is a true replica of the finest light plane in the world today. Complete kit, including many finished parts such as wheels, propeller, wire fittings, nose plug; also full-size plans, printed balsa, etc. Made especially for us by a well known manufacturer. A really beautiful model that gives much pleasure building, and hours of enjoyment in the air. You may never again have the opportunity to secure 12 big issues of MODEL AIRPLANE NEWS, plus the fine 1938 Taylor Cub model airplane kit at this price . . . so take advantage of this sensational bargain offer NOW!

FULL YEAR FOR $1

MODEL AIRPLANE NEWS is written for enthusiasts of PRACTICAL aviation. The editors are experienced technical experts, drawing the finest materials from master builders all over the world—many of the contributors being World's Record holders. 64 pages each month—dozens of models—latest developments—hundreds of photographs of fine ships and enthusiastic model builders.

Regular newsstand price is 20 cents a copy. That's $2.40 a year. Subscribe now and save $1.40 real money. Model builders in 55 countries of the world depend upon MODEL AIRPLANE NEWS for reliable information on the events of Modeldom.

ALTERNATE OFFER

In the event premium is not desired subscription will be entered for a period of 13 months. Check coupon accordingly.

USE THIS COUPON

20¢ PER COPY AT ALL NEWS STANDS

MODEL AIRPLANE NEWS
551 Fifth Avenue, New York, N. Y.

For the enclosed $1.00 please send me:

☐ MODEL AIRPLANE NEWS for 12 months, also send me, FREE, the Taylor Cub Flying Model Kit.

☐ MODEL AIRPLANE NEWS for 13 months. (No Kit.)

Name..... *Age*.....

Address.....

City..... *State*.....

This offer good in the United States and Canada; offer, excluding kit, also good in U.S. possessions, Cuba, Mexico, Panama and South America.

10th YEAR OF PUBLICATION

VOL. XIX *No. 2*

Edited by Charles Hampson Grant

CONTENTS

AUGUST, 1938

Our Air Force Tests Its Strength
By Fletcher Pratt 4

How to Improve Your Glider Flight
By Walter L. Weitner 6

A Radio Controlled Powered Soarer
By Clinton B. DeSoto 8

The Physics of the Airplane
By Lt. James Eames and Willis L. Nye 11

Build the Messerchmitt Minute Model
By Herbert K. Weiss 12

Wakefield Fourth Place Winner
By Vernon Boehle 14

The Seversky Super-Clipper
By David C. Cooke 15

A High Performance Flyabout
By E. Lidgard 16

Frontiers of Aviation
By Robert C. Morrison 18

N.A.A. Junior Membership News 22

How to Build a Payload Gas Model
By Thracy Petrides 24

Designing Your Gas Model "Prop"
By Charles Hampson Grant 27

"Gas Lines" 28

Air Ways—Here and There 31

The Hybrid Airplane Contest No. 1
By Nick Limber 34

NOTICE

This entire magazine, as well as each and every part thereof, is protected by copyright in the United States and foreign countries. No person, firm or corporation has the right to reproduce the whole of this magazine or any part thereof in any form or fashion. All reproduction rights of any kind are exclusively reserved by the publisher of this magazine. Copyright under international copyright convention. Any infringement will be prosecuted to the fullest extent of the law.

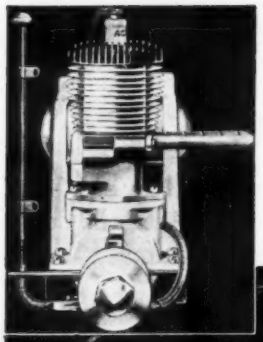
Published Monthly by JAY PUBLISHING CORP., Mount Morris, Illinois.
Editorial and General Offices, 551 Fifth Avenue, New York City.
George C. Johnson, President. N. Howard Williamson, Secretary.
Jay P. Cleveland, Advertising and Business Manager, 551 Fifth Avenue, New York, N. Y.
Entered as second-class matter Dec. 6, 1934, at the post office at Mount Morris, Ill., under the act of March 3, 1879. Additional entry at New York, N. Y.
Copyright 1938 by JAY PUBLISHING CORP.
Price 20c a copy. Subscription price $1.65 a year in the United States and its possessions; also Cuba, Mexico and Panama.
$1.65 in Canada. All other countries $2.50 per year.
Contributors are especially advised to be sure to retain copies of their contributions, otherwise they are taking unnecessary risk. Every possible effort will be made in our organization to return unavailable manuscripts, photographs and drawings (if accompanied by postage), but we will not be responsible for any loss of such matter contributed.

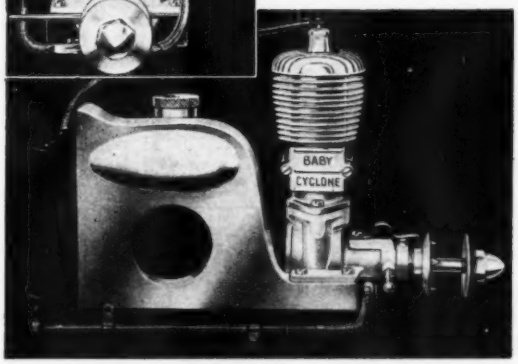
The Great Demand

FOR THE NEW IMPROVED

BABY CYCLONE

1938 MODEL "F"
THE BEST AND ONLY ENGINE WE BUILD





HAS INDUCED US TO EXTEND OUR

SPECIAL INTRODUCTORY OFFER

TO

AUGUST 31, 1938

Buy Baby Cyclone **THE BEST ENGINE IN THE WORLD.** CHAMPION OF THE UNITED STATES, ENGLAND, GERMANY, FRANCE AND BELGIUM.

NEW 1938 BABY CYCLONE Model "F" Engine Complete & Assembled. Including

1. Coil. 2. Condenser. 3. Drawn Steel Engine Mount with Integral Gas Tank. 4. Remote Control Throttle. 5. Can of Lubricating Oil. 6. Exhaust Manifold. Engine Factory Tested, "Broken In," Ready to Run. Fully Guaranteed Against Defective Materials or Workmanship.

Price **$12.50**

BABY CYCLONE PROPELLER: Specially Designed, 12¼" Diameter, 8" Pitch. Tested and Balanced for Maximum Efficiency. **1.50**

TOTAL LIST PRICE, COMBINATION... *Propeller and 1938 Baby Cyclone Model "F" Engine.* **$14.00**

LESS 30% SPECIAL OFFER **4.20**

Win Meets... BE A CHAMPION

REMEMBER THAT—The famous Baby Cyclone has beaten every engine in the world in competition and is the undisputed World's Champion.

- It can only be purchased direct from the manufacturer (Aircraft Industries) in the U.S.A.
- It has won for others and it will win for you.
- Own the BEST engine in the world and win meets regularly.

Your Price $9.80

COMPLETELY ASSEMBLED BABY CYCLONE "F" WITH PROPELLER
POSTAGE PREPAID ANYWHERE IN THE UNITED STATES

"CYCLONE SERVICE" ⟶ Your engine positively will be shipped on same day your order is received

BUY DIRECT. WE HAVE NO DEALERS IN THE UNITED STATES

PRICE IN ALL FOREIGN COUNTRIES $19.60 FOR DURATION OF THIS OFFER

ORDER BLANK - MAIL TODAY

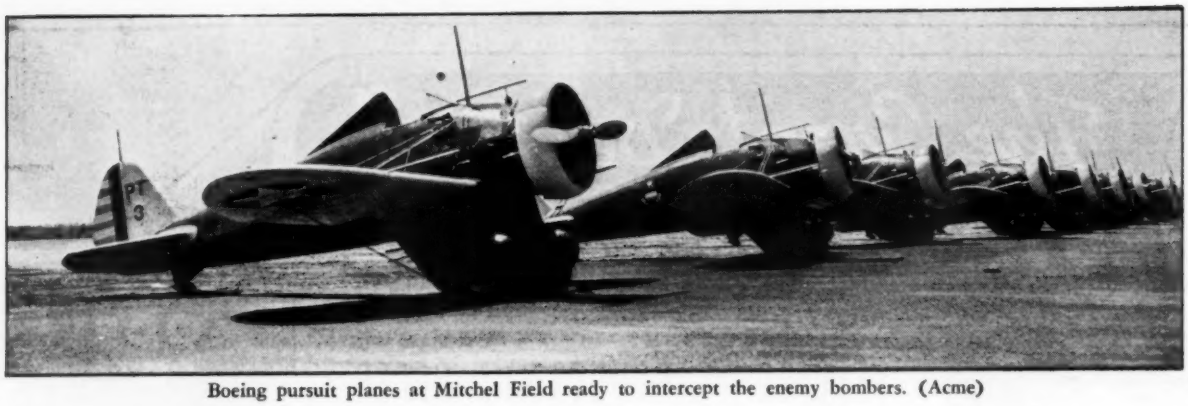
AIRCRAFT INDUSTRIES, GRAND CENTRAL AIR TERMINAL, GLENDALE (LOS ANGELES), CALIFORNIA

PLEASE SEND ME POSTPAID THE FOLLOWING ITEMS CHECKED. I ENCLOSE **POST OFFICE MONEY ORDER.**

☐	BABY CYCLONE MODEL "F" (Completely Assembled as Above)	$12.50	☐	BABY CYCLONE MODEL "F" (Completely Assembled as Above)	$12.50
	PROPELLER	1.50		PROPELLER	1.50
		$14.00		"CHIEF" KIT	5.00
	Less 30% Special Offer	4.20			$19.00
	YOUR PRICE	$ 9.80		Less 30% Special Offer	5.70
				YOUR PRICE	$13.30

☐	BABY CYCLONE MODEL "F" (Completely Assembled as Above)	$12.50
	PROPELLER	1.50
	"CHAMPION" KIT	7.50
		$21.50
	Less 30% Special Offer	6.45
	YOUR PRICE	$15.05

SHIP TO _____ Age ____ ADDRESS _____ N-8



Boeing pursuit planes at Mitchel Field ready to intercept the enemy bombers. (Acme)

Our Air Force Tests Its Strength

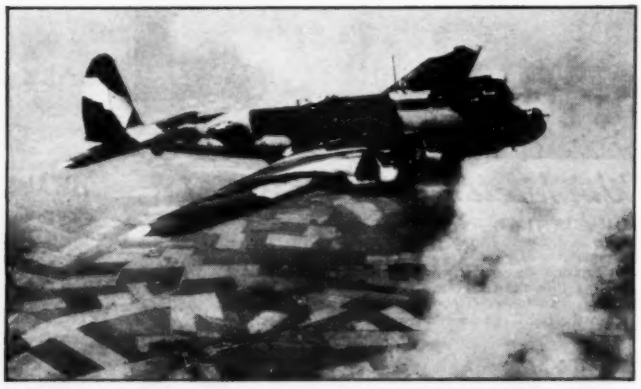
By FLETCHER PRATT

What Happened at Farmingdale and What Was Learned About the Defense of Our Atlantic Coast From the GHQ Aerial War Games

IS OUR coastline on the Atlantic, with the great cities and the immense industrial plants close to it, protected against foreign air attack?

This is the way most of the newspapers put the question to be answered experimentally in the "Farmingdale Blackout," which came as the climax to the greatest air force maneuvers ever held in the United States. Most of them summed up the results as demonstrating that the coast was not well defended; that

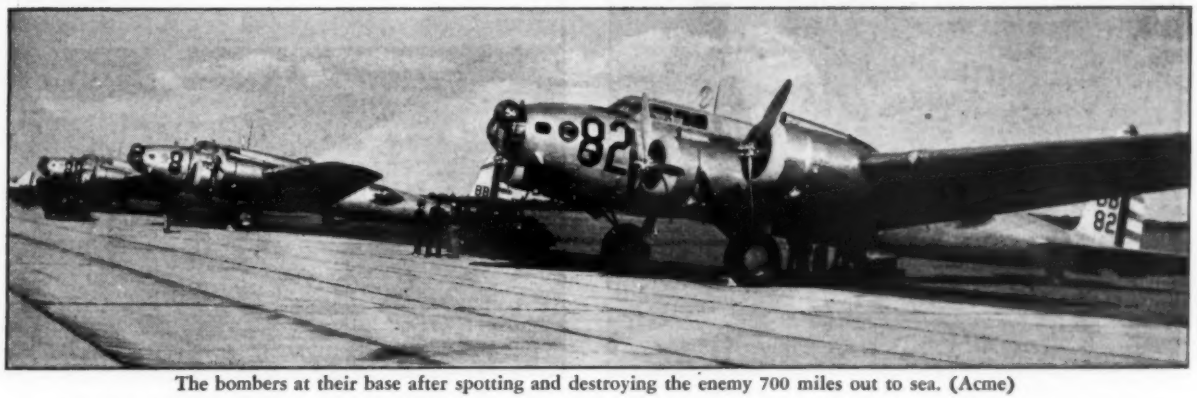
Defense bombers over New York. (Acme)



A giant Boeing Flying Fortress, camouflaged so that it blends into the pattern of the checkered landscape. (Intern'l)

Loading bombs before a take off. (Intern'l)

Officers plan the air defense of our coast. (Intern'l)

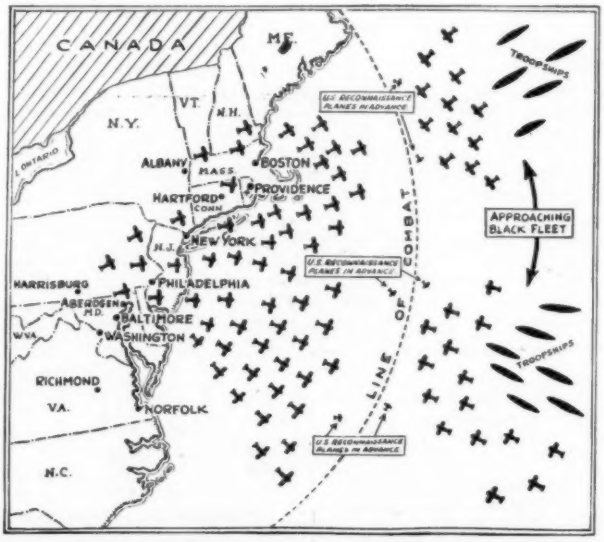


The bombers at their base after spotting and destroying the enemy 700 miles out to sea. (Acme)

our anti-aircraft artillery was both inefficient and insufficient; that our pursuit ships are incapable of doing much damage to enemy bombers and that we have not enough airplanes of any kind to make a respectable defense.

Actually, every one of these hasty answers was wrong, and they were wrong mainly because the question was wrongly stated. The air defense of our coasts is primarily the task of the navy, which is one of the most efficient flying services in the world, both in numbers and quality. The Army Air Corps, which conducted the recent maneuvers, has no intention of taking over the navy's functions. The problem it set itself to solve was altogether different from the general one of the defense; much more limited; and the answers were more comforting in some respects and more startling in others than the newspapers said.

In the American Army most of the aviation is attached to the various army corps. It is under command of the generals who head these corps, and is used by them for military purposes in connection with the operations of these corps, that is, in cooperation with the ground troops, infantry, cavalry, artillery, tanks. But in recent years there has been a good deal of discussion of what is called a "GHQ Air Force," which means a force of airplanes directly at the disposal of the commanding general of the army, independent of all ground troops, and operating for general strategic purposes not connected with the movements of those troops. Many armies have such forces. A good example in actual war are the airplanes of the Spanish Rebels, which, based on the Balaeric Islands, fly over and bomb the cities of Loyalist Spain every now and then.



A map showing how the air force defended the coast from the attack of the enemy fleet. (Intern'l)

The beginnings of such a GHQ Air Force have long since been made in the American Army, but the strength it ought to have and what it could accomplish under war conditions are, or were until the recent maneuvers, very much undecided. It was to find answers to these questions that the maneuvers were held, and everything that happened there was subsidiary to this purpose.

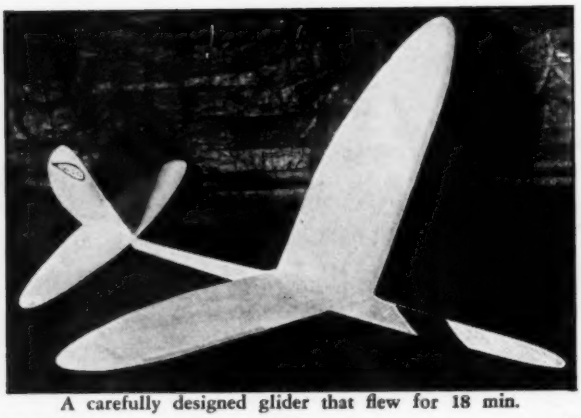
Obviously, such an experiment must be carried out under conditions as closely approximating those of actual war as possible. It is therefore arranged that the umpires of the war game inform the players of what the enemy are doing, and the players proceed as in actual war, issuing orders, making reports, flying and shooting. The only difference is that the bombs are loaded with sand and the guns with blanks. Now since these particular maneuvers were arranged to study the value of an independent GHQ Air Force, a situation had to be imagined in which such a force would have to carry the main load of the national defense, without much help from either the navy or the army. This is what the army heads worked out:

The United States is at war with a coalition of European and Asiatic powers, called the Black Alliance. Our navy, with all its ships and planes is extremely busy fighting the Asiatic members of the Black Alliance in the Pacific. It is, of course, important to keep the European members of the Alliance from landing troops on our east coast and damaging the big cities and factories that cluster there; and they are approaching the United States with a battle fleet, aircraft carriers and thansports, intent on doing exactly that. As the army will not come into action till they have landed, the GHQ Air Force is the only thing that can interfere with them.

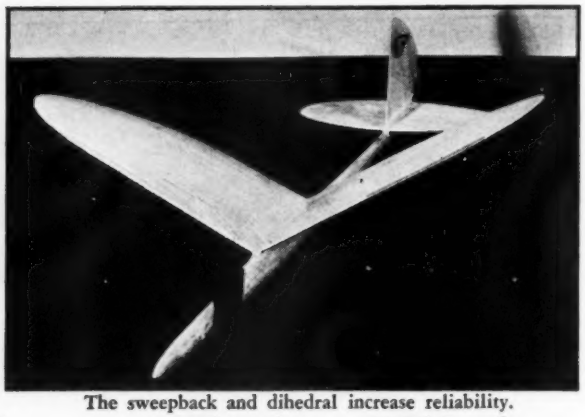
This was the background of the problem. As to its specific details, General Frank M. Andrews, in command of the GHQ Air Force was informed by the umpires that American spies had sent through informa-

(Continued on page 48)

A 17-A Attack planes camouflaged so they are practically invisible at a short distance away. (Intern'l)



A carefully designed glider that flew for 18 min.



The sweepback and dihedral increase reliability.

How to Improve Your Glider Flights

Vital Suggestions Concerning the Technique of Glider Design and Operation That Will Enable You to Secure Better Performance

By WALTER L. WEITNER

GLIDER activity has been growing into a very popular branch of model airplane activity in the past few years. Practically every model builder has had experience in connection with this phase of the game and has been more or less successful in it. Many of these modelers have their own "pet" designs while many more do not know just what characteristics to employ in their gliders to make them successful, consistent fliers. To these, especially, the following information will be of the most benefit.

Early type gliders employed stubby, non-sweptback, non-tapered wings. Tips of wings were rounded while the tail sections were generally of a square outline, employing no airfoil but a square section throughout. Finishes of these gliders were not considered of any importance. Therefore it was not unusual to see gliders which had not been brought into contact with sandpaper. These factors had a decided effect upon their flying ability and flights of over thirty seconds were unusual since an altitude of over forty feet was seldom attained. Builders soon found that with smoothing the surface of the wood the glide was considerably improved. Even with this improved glide, however, the boys knew that what was actually needed was to attain higher altitude on the throw. They began experimenting with sweepback, different length moment arms, fine finishes and streamlined surfaces. These in turn made the glider a sleek, polished ship capable of 100 feet or more of altitude when launched, necessitating great strength in construction. This great stress required exceptionally great strength where the wing joined the fuselage. A tough skin of cement was the answer to this problem. Thus the old box-like affairs of the first all balsa gliders were the basic designs for our modern, highly efficient ships. We are still experimenting to find the characteristics to employ in the design of the glider which will eventually lead to the nearest possible "perfect" design.

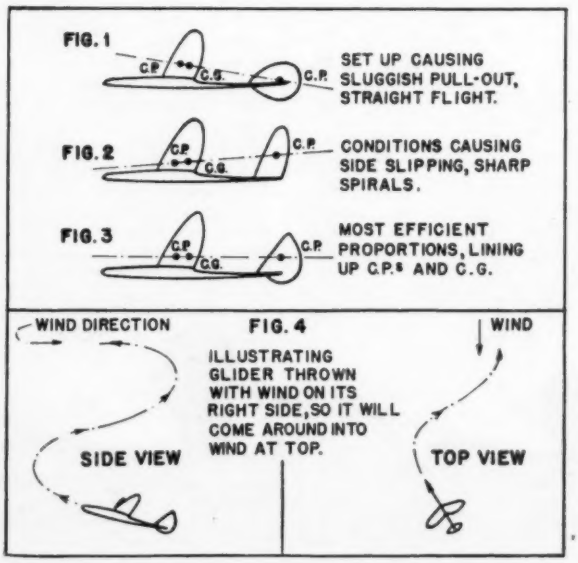
In most contests of today the glider event is one of the main features and one of the more popular events. One reason for this is that the glider is simpler to build, more rugged, and its size, usually under twenty-two inches, makes it quite easily carried to contests, flying fields, etc. Lately, there have been reports of many excellent glider flights, some eclipsing the record times of many of the rubber power planes. These are due to excellent designs, fine workmanship and a lasting up-current of air.

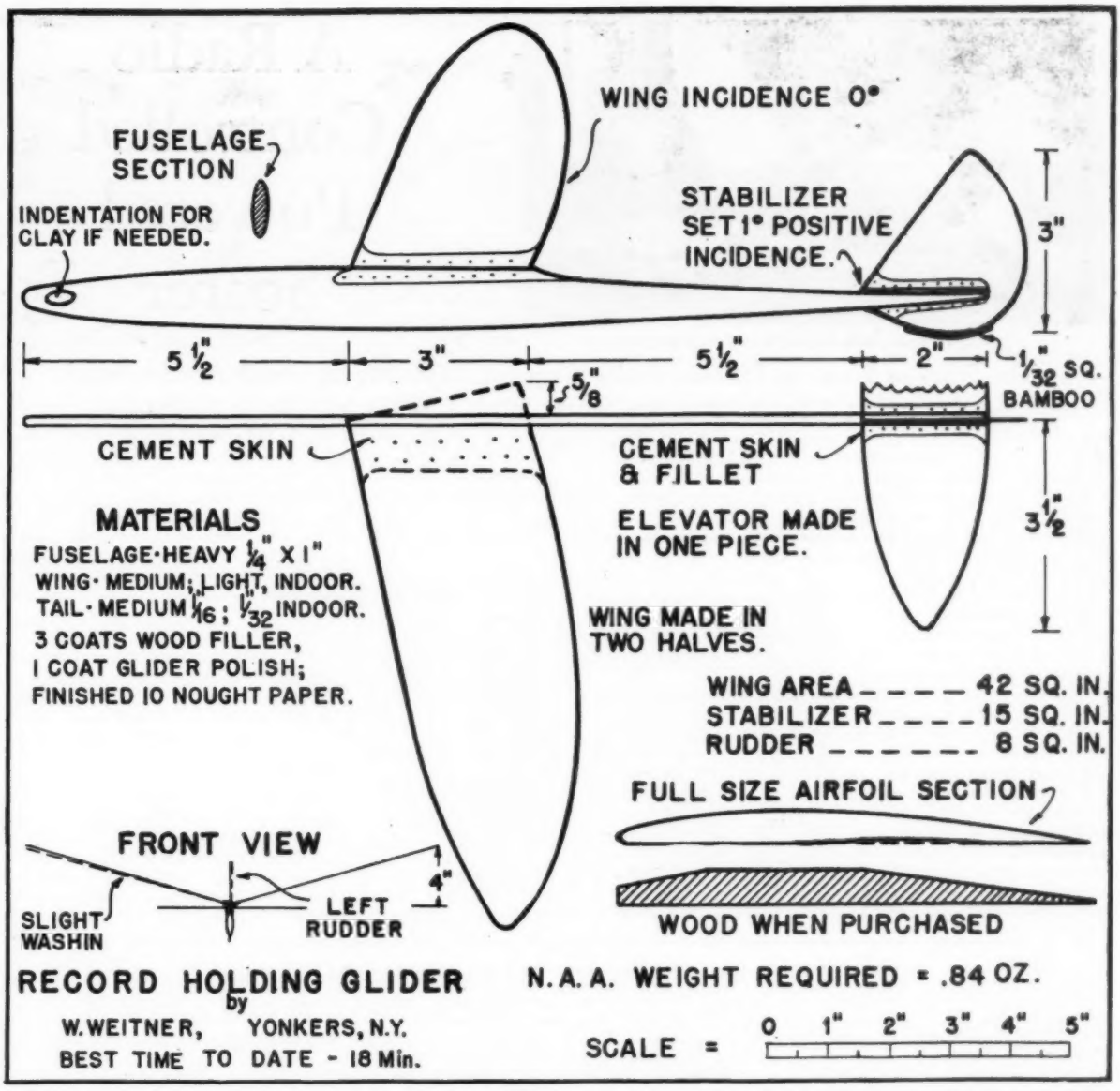
Since it has been found that sweepback adds to the altitude gained on the throw and all around stability, this characteristic of design is employed on most present day models. This brings the center of gravity of the model backwards, to present a more even distribution of fore and aft weights; thus requiring less weight for balance. In obtaining this sweepback the center section of half the glider wing is squared off. About 5/8-inch is then measured along the trailing edge toward the tip of the wing. From this point a line is drawn to the vertex of the right angle at the leading edge of the wing; and it is along this line that the cutting edge is drawn. This procedure is then repeated on the other half of the wing, completing the operation. The two halves are then cemented together to form approximately an eighteen degree sweepback angle on each side. With this arrangement, between three and four inches of dihedral, on a twenty inch wing, proves most efficient.

The question of what length moment arm is to be used now arises. Both "long" and "short" have their respective advantages and disadvantages. A disturbing force will have a greater effect on a short arm than on a long one. While the long moment, being slower to react to stabilizing forces, loses its previous advantage over the short one. On the throw the short moment arm glider will recover more quickly because of its stabilizing qualities, while a longer moment ship will gain more altitude before it fully recovers to go into its straight glide.

As can be seen, it is up to the designer and his experience as to what length arm is to be used on his ship. Weather conditions would have a decided effect upon this factor. In windy or breezy conditions, a shorter arm glider has proven its merit, while in calm weather a glider of greater moment length has shown itself most efficient.

Before considering the moment arm, however, the tail area





to be used must first be determined. On the average glider of twenty inch wing span and 42 or 45 square inches of area, a stabilizer of eight inch span, and 14 or 16 square inches in area is most efficient. This constitutes about 23% of the wing area and has been found to work better than any other set-up. With this given amount of stabilizer area a moment arm of between four and six inches has proven its efficiency.

After considering the elevator area, the next step is to find how much rudder area is required. This usually is best found by taking approximately 14% of the wing area. Since a few builders have the tendency to place some of the rudder surface below the fuselage, they find some new forces acting on their ships while in flight, which they did not count on. The model does not "pull out" as it should from the throw, but instead, stalls and loses quite a bit of altitude before leveling off from the resulting dive. It also tends to head in a straight line in the direction thrown, ignoring all former adjustments made by the flier. This is a sure sign that too much of the rudder area is below the fuselage. To correct this situation all but 1 or 2 square inches should be cut away from the bottom and an addition made to the top. (Illus. Fig. 1.)

On the other hand when the rudder is extremely high, the slightest breeze or wind will cause the model to slip sidewise after it has assumed level flight, losing altitude as it does so. This, also, is a disadvantageous arrangement, since the high rudder sacrifices strength and it is quite liable to collapse from the tremendous force of the throw. (Illus. Fig. 2.)

The most efficient set-up in a series of tests proved to be the rudder having one or two square inches below the fuselage, leveling off the imaginary line connecting the centers of lateral area and greatly strengthening the tail unit as a whole. (Illus. Fig. 3.) (Appreciation is extended Mr. Charles Grant for the explanation of this principle.)

Lately the N.A.A. weight rule, which requires one ounce for each fifty square inches of wing area, has been applied to these motorless craft. Therefore a problem has arisen in the form of weight distribution, which must be solved. The most likely answer is that, since this added weight must be carried by the model, it might be used to some advantage in stabilizing the model instead of being a total handicap. Therefore a good part of this weight should be in the fuselage and lower parts of the glider. The weight rule forces the average glider to weigh from .6 to 1 ounce. If care is not taken in the selection of the material for the glider, the ship will probably weigh only half that when it is completed. Weight must then be added, usually making the ship completely un-airworthy.

Select medium heavy wood for tail and wing and extra heavy for the fuselage, since this part must absorb most shocks. The fuselage should be of a streamline, teardrop section while the wing is sanded to a previously determined airfoil section, to give the most lift per unit of weight. Also,

(Continued on page 36)

The 18 foot plane with graceful gull wings.

A Radio Controlled Powered Soarer

The Story of How an Efficient Radio Controlled Gas Model Has Been Developed by Equipping a High Efficiency Soarer With a Motor and Radio Mechanism

By CLINTON B. DeSOTO

THE original idea which dominated the production of a radio-controlled plane was to build a high-performance soaring plane capable of carrying enough radio gear to accommodate any reasonable system, and soaring with it in light thermals or ridge winds.

The "powered glider" phase is a comparatively recent one. Interminable waiting for favorable weather conditions at the few available sites suitable for hand launching led to consideration of—in desperation—a power winch. Ordinary shock cords and hand tows were out of the question, of course. Then came an article by Peter Reidel in "Soaring," on powered sailplanes, that set us off.

The motor housing was hurriedly assembled, the Forster motor "played with" until fair reliability was achieved, and we started in. So far the synchronization of control gear problems with gusty April winds has not allowed any extended flying; but we do know that "Little Hercules" will keep the ship up and even make it climb a bit, although it must be hand-launched (the run-and-heave system!) still. At least we can now visualize the goal, which will be to have the motor fly the ship into the wind for five minutes or so—long enough to gain the altitude needed for the real sport: soaring the ship into thermals and ridge winds for duration and altitude marks.

The problems of power and radio-control were not the only ones to be solved. Behind them lay the design and construction of the ship itself. Owing to its necessarily increased size and weight, the design of a radio-controlled plane combines the problems of model building and the design of a full sized airplane or sailplane.

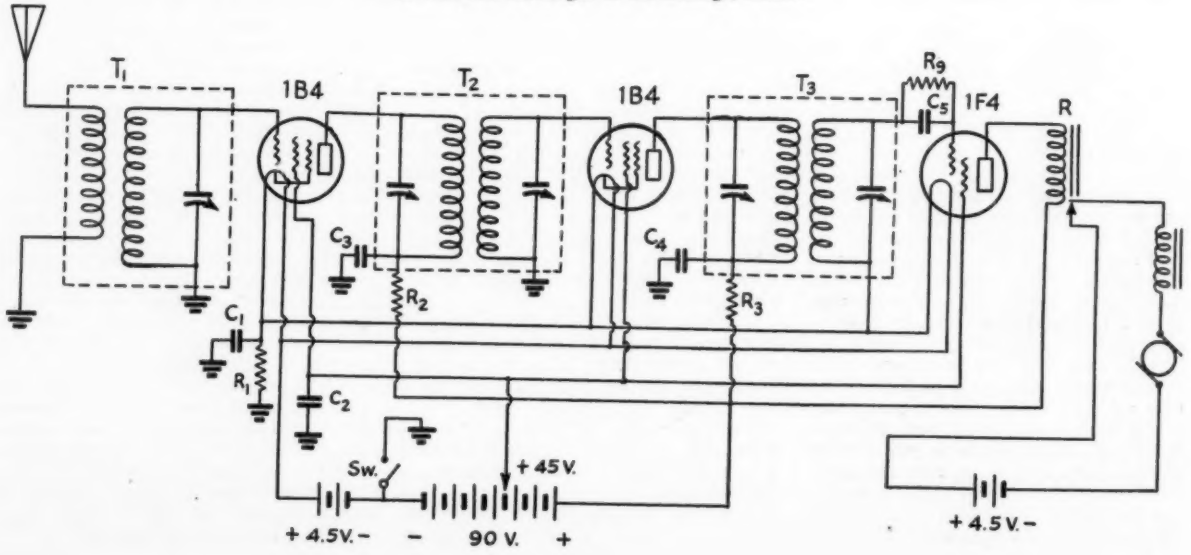
In building a ship for the purpose of carrying on further experiments with radio-control methods, the basic requirement was made an ability to carry sufficient weight to permit the use of a wide variety of systems. A consideration of all the systems that might rationally be utilized for model work disclosed that in all probability no single-channel system would weigh over ten pounds, and there was little excuse for a weight exceeding five.

In contrast to full size airplanes, but akin to sailplanes, the abuse received by models in the form of crash landings, etc., necessitates a comparatively low payload /weight ratio. Ross Hull's experiments indicated that the purely structural part of the ship—the strength-giving portions—should have at least twice as much weight as the surplus load. Otherwise, the structure would be too flimsy to withstand landing shocks.

With a control weight of five pounds and a two to one ratio, the basic dimensions could be set up. A wing loading of ten to twelve ounces seemed reasonable,

CIRCUIT DIAGRAM OF THE 1750-KC. RECEIVER

T1—Antenna coupling coil (Sickles 4081); T2—1600 kc. i.f. transformer (Sickles 8084); T3—Same as T2; C1, C2, C3, C4—0.01 mfd. 200-volt tubular paper condensers; C5—500 mmfd. midget mica fixed condenser; R1—10-ohm 1/2-watt fixed resistor or 10-ohm rheostat; R2, R3—5000-ohm 1/2-watt fixed carbon resistors; R-4—2-megohm 1/2-watt fixed carbon resistor; R—Eby 5000-ohm relay. Ordinary flashlight cells are used for filament and motor supply; "B" batteries are Burgess X30FL. The antenna is a 5-foot length of wire run the length of the fuselage, inside.



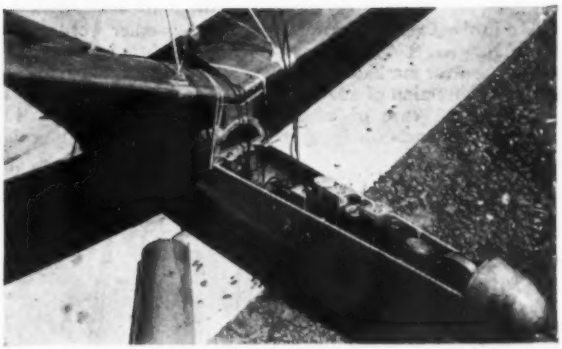
leaving a margin for an even heavier system if that occurred as a necessity (of course, since a heavier system would probably be more reliable the crash danger would be minimized). That meant an area of about twenty square feet, a span of about eighteen feet for an aspect ratio of fifteen with tapered tips, the minimum for a really high-performance soarer.

It should perhaps be emphasized that these dimensions are not the basic minimum required for a successful radio-controlled craft. Even the five pound limit is exceedingly generous for a single-channel control system. The one to be described actually nets about 3-1/2 lbs., and workable systems have been built weighing but two lbs. Indeed, a 1-1/2-lb. figure is in sight. Based on the three lb. figure, the wing area can be reduced to twelve or even ten square feet—twelve to fourteen feet span, with similar A.R. Such a ship is comparable in construction with ordinary gas models, and is by no means beyond the scope of the average model builder.

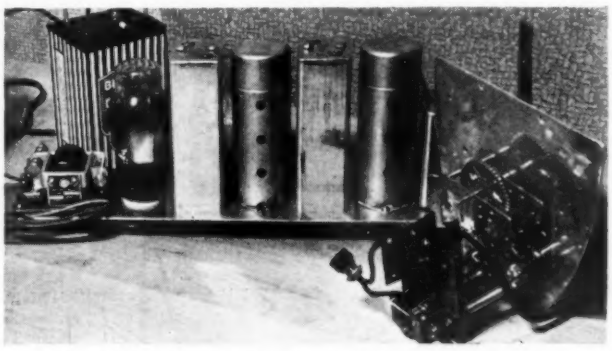
So the thing took form: A tail arm 2-1/2 times the chord, which is standard practice. A structural weight not to exceed ten pounds. Ruggedness, lightness and high performance. That meant minimum drag at all points through careful streamlining and fairing. A high L/D ratio, to give a large gliding angle. With this must go low sinking speed; or, at least, that was our conviction. Others may disagree. Anyway, a high lift wing section was indicated, one with low drag, too. In actual construction this section was modified to give a reverse curve at the trailing edge, reducing the center of pressure travel, to provide vital stability.

A full cantilever wing of the dimensions shown must combine great strength and lightness. This was achieved by integrating the structure as two complete box spars, comprising the leading and trailing edges. The solid main spar is made up of 36-inch lengths of 1/4" x 2" hard balsa, these lengths fitting conveniently into the general layout. Ribs of 1/8" hard balsa are spaced every four inches, butting into a stepped leading edge and a notched trailing edge. The main box spar is completed by planking the section between the L.E. and the main spar member, using 1/8" x 3/8" medium balsa planking.

The rear box spar is made by adding three widths of the same planking in front of the trailing edge and "boxing" by fitting pieces of balsa between the ribs. Cap strips on the remaining exposed parts of the ribs, small balsa gussets where these cap strips butt onto the spars, and further planking-in around the dihedral joints, center joint and tips, complete the structure. When covered with well-doped 100-weight cambric the wing assembly has great resistance to all distortion except in the vertical plane. Here it is quite flexible, the tips rising perceptibly with rising speed in launching. This doubtless accounts for the fact that it has survived some amazing shocks.



The radio control equipment installed in the nose of the ship. Six flashlight cells occupy the space between the tuning meter (used to facilitate synchronization with the transmitter) and the nose block. A key switch prevents unauthorized tampering; the other two switches control the receiver and ignition.



Receiver and control mechanism, showing d.c. motor and gear train. Simple impulses actuate the relay at the left, which turns the motor off and on.

The fuselage is made of rolled plywood, glued to 1/4" plywood bulkheads. Ahead of the wing T.E. the thickness of the covering is 3/64ths; toward the rear it is 1/64th. The latter, although light as heavy paper, is surprisingly strong when rolled. With the solid nose block securely attached, the fuselage structure is extremely strong and will absorb all ordinary landing shocks with ease, whether near the nose or along the 1/4" thick spruce keel.

The tail surfaces are built of balsa, in orthodox fashion, with planking similar to that on the wing. The fin and stabilizer are built integrally to facilitate assembly, the latter riding high both to avoid some of the effect of wing wash and to protect it on uneven terrain when the ship rests on a wing tip. A solid rudder post is bolted into the fuselage end, the front of the fin being held by heavy rubber bands over a thin sheet aluminum fuselage reinforcement. The rudder is hinged on small aluminum tabs, allowing free movement.

The motor nacelle is built around 1/4" square spruce stringers, assembled on a pair of plywood bulkheads and a plywood platform which holds the engine. The stringers are covered with 1/8" x 3/8" balsa planking, and the whole finished with aluminum dope. (If the ignition coil touches the aluminum paint it should be well wrapped with tape, by the way, or it may short through the container.) Aluminum flanges bolted to the bulkheads provide mounting connections. The housing is supported by four 1/4" diameter 17S-T aluminum rods, which are in turn bolted to wing clips made of 1/32" sheet aluminum. Four No. 18-gauge steel wires with turnbuckles run to the gull breaks in the wing, serving both to add a little extra strength and to hold the housing down as the motor pushes the ship along in flight.

The pusher type of installation was not originally contemplated, but was necessitated to locate the center of gravity properly with the radio gear stowed as it is. Were it to be made a tractor, some of the batteries would have to be put back of the wing—obviously an awkward proceeding.

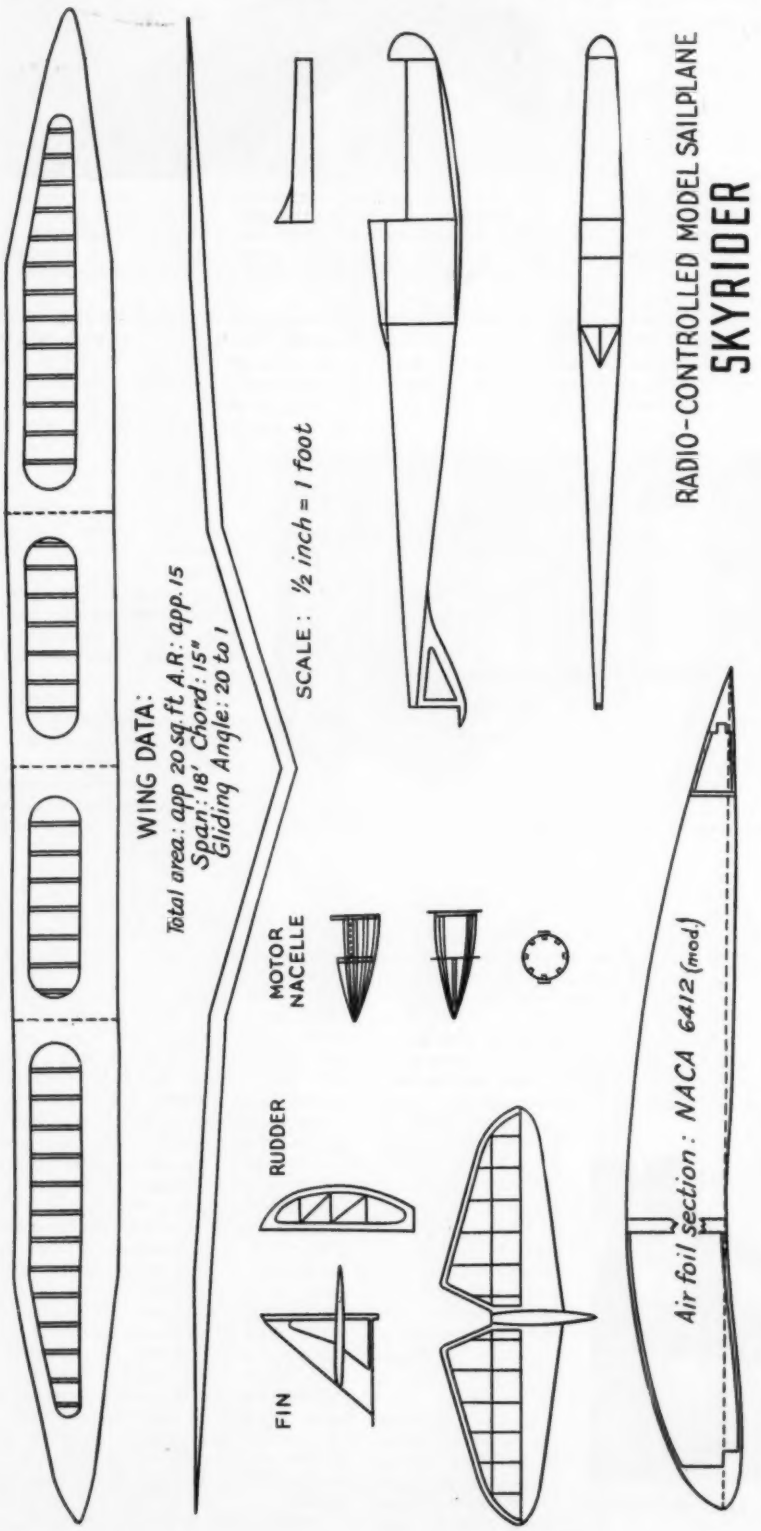
Incidentally, this motor and propellor combination is not an entirely desirable one for the job at hand. With comparatively slow flying, under-powered ships, maximum propellor efficiency is attained with large, slow moving props. Our eighteen inch prop turning over at 4000 r.p.m. or more is certainly not that. A twenty-four inch propellor, geared down to 1000 r.p.m. might mean the difference between 50 or 60% and 80% efficiency or more.

Turning now to radio control, the sys-

The motor mount and rudder detail are shown here. The fuselage is made of plywood.

tem currently in use differs from that described in the January issue of MODEL AIRPLANE NEWS in both the type of receiver and the control mechanism. Both changes are in the direction of added reliability of operation and ease of adjustment; but they are made, necessarily, at the expense of some lightness and compactness. In other words, this system is for larger and heavier ships. For small, light ships the other is more suitable.

The control mechanism in this case utilizes a small d.c. motor to operate the rudder, rather than the rubber band motor, escapement actuated, of the Hull system. This motor, properly installed, is somewhat more reliable in action than any but a most carefully designed and machined escapement mechanism, and provides appreciably more power, insuring that the rudder will turn even if control wires stick or the air force on the rudder is great. Indeed, when sufficiently geared down the power is so great that the rudder bar can scarcely be stopped with the hand.



But the biggest advantage of the motor is that it provides continuous control, enabling any rudder setting desired. This smooth control obviously permits smoother maneuvers than when only three positions are available. As used, the rudder bar travels quite rapidly through the intermediate stages and pauses appreciably at the extreme of the cycle, owing to the "sine wave" action of the rotary control wheel.

As can be seen in the photographs, the mechanical part of the control system comprises the following elements: (1) An aluminum plate whose outline is the fuselage shape, which serves as a support for the remaining elements; (2) a rudder bar with bearing at the bottom of the plate, slotted to receive a moving pin on the control wheel disc. This bar pulls a length of strong cord over pulleys, the cord being tied into lengths of No. 28 brass wire which connect to the rudder arms; (3) a two inch aluminum control disk mounted on the low speed drive shaft of the gear train, fitted with a pin which operates the rudder bar; (4) a gear train with approximately 1000-to-1 reduction, taken (of course!) from a defunct alarm clock and suitably revised; (5) the motor.

The motor was made for use in an automobile defroster unit, and can probably be secured through automotive wholesalers or dealers. It weighs eight ounces complete with wiring. It will operate on 4.5 volts with a current consumption of about 0.6 ampere. The assembly must be carefully aligned to eliminate undue friction; otherwise the motor may refuse to start on the occasions (about 1 in 10, perhaps) when the armature happens to stop flush with the pole pieces. With six volts at 0.9 ampere it is entirely reliable even with considerable friction.

The exact gearing ratio to be used is a debatable point. Since this installation was in the nature of a preliminary experiment we were perhaps unduly afraid of not being able to realize the exact functioning of the control in operation. In consequence the ratio used is somewhat too high. It takes about ten seconds to complete an entire cycle (one revolution of the control disk). Obviously, this does not permit any rapid maneuvering, but it does provide accurate knowledge of the degree of rudder movement from the ground. We now feel that twice this speed would perhaps be optimum, while a complete cycle occurring in two seconds would be entirely practical for a rather fast ship. Since the motor used operates at something between 4000 and 5500 r.p.m. (depending on loading and voltage), this would mean a gearing ratio of 300 to 500, or even less.

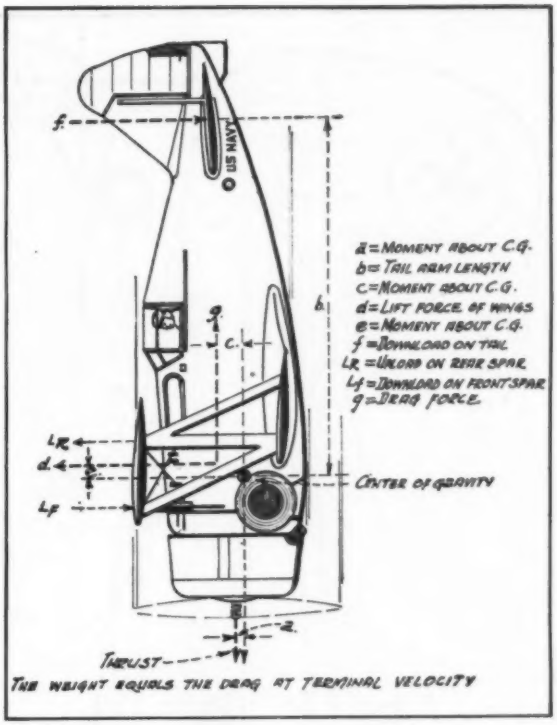
The radio system makes use of a trans-

(Continued on page 53)

The Physics of the Airplane

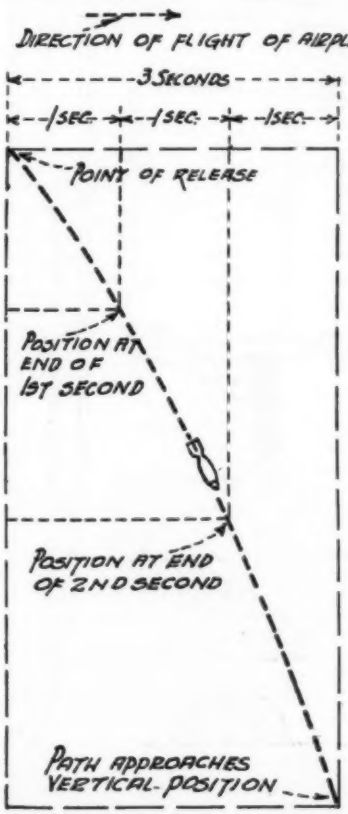
The First Article of a Series by Two Noted Authors Giving a Complete Explanation of the Action of Physical Forces That Are Embodied in the Problem of Flight—Information That Model Builders, Future Engineers and Designers Cannot Afford to Overlook

By LT. JAMES EAMES and WILLIS L. NYE



The Translational Motion of an Airplane

DID it ever occur to you that the science of aeronautics is based fundamentally on the elementary laws of physics? Did you ever take time out to really analyze what happens when the airplane flies, when the glider glides, or what happens inside of the engine when it emits a sharp staccato bark and jumps into life? As Mr. Ripley would say, "Believe-it-or-not, but the science of aeronautics is an amplification of the elementary laws of physics." And this is exactly what happens. There is nothing so complex as aeronautics if the fundamentals are unknown, and nothing so simple once these fundamentals are mastered. Thus at the start a paradox is presented to the student. The purpose of this series of articles is to erase this paradox from the mind of the tyro student.



Aircraft are subject to the three fundamental motions of bodies. These are as follows:

(1.) Translation in the vertical and horizontal planes.

(2.) Rotation about the respective axes.

(3.) Vibration and oscillation which affects the structure.

A flying machine, when it is moving along a fixed course in the same general direction, has horizontal translation. If the machine exhibits turning tendencies or is engaged in acrobatics it may indulge in motions of rotation about its respective axis. Thus it can be understood that the flying machine, when considered as a body, can have both horizontal translation and motions of rotation at one and the same time. The general motion of the airplane must always be in the forward direction in respect to its longitudinal axis. It, however, can be subject to vibration, which may be induced in parts of the structure by improper balancing of the propeller or the engine or tail flutter caused by undulations in the slipstream. The machine in its general horizontal translation may hunt or be subject to a tendency to yaw about its vertical axis. This yawing may approach a continuous amplitude as the machine flies from one side to the other. Vibration in the structure can be cured by two methods. One method entails complete balancing in a dynamic manner of all couples or forces acting about a common axis in opposition to each other for reciprocating masses, such as found in the counterweight of the radial engine or the propeller. The other method is to build the structure heavy enough so that its natural period of oscillation lies above or below the period of oscillation of the reciprocating parts. The tendency to yaw about the vertical axis is purely one of aerodynamic nature and can be cured by sweepback of the wings.

The velocity of the airplane may be defined as: "the rate at which the airplane flies through space in a given unit of time in a specific direction." In the investigation and determination of airplane performance, the study of velocity assumes paramount importance. The following equation is of interest:

Velocity of the airplane = Distance per unit time $= \frac{\text{Distance}}{\text{Time}}$

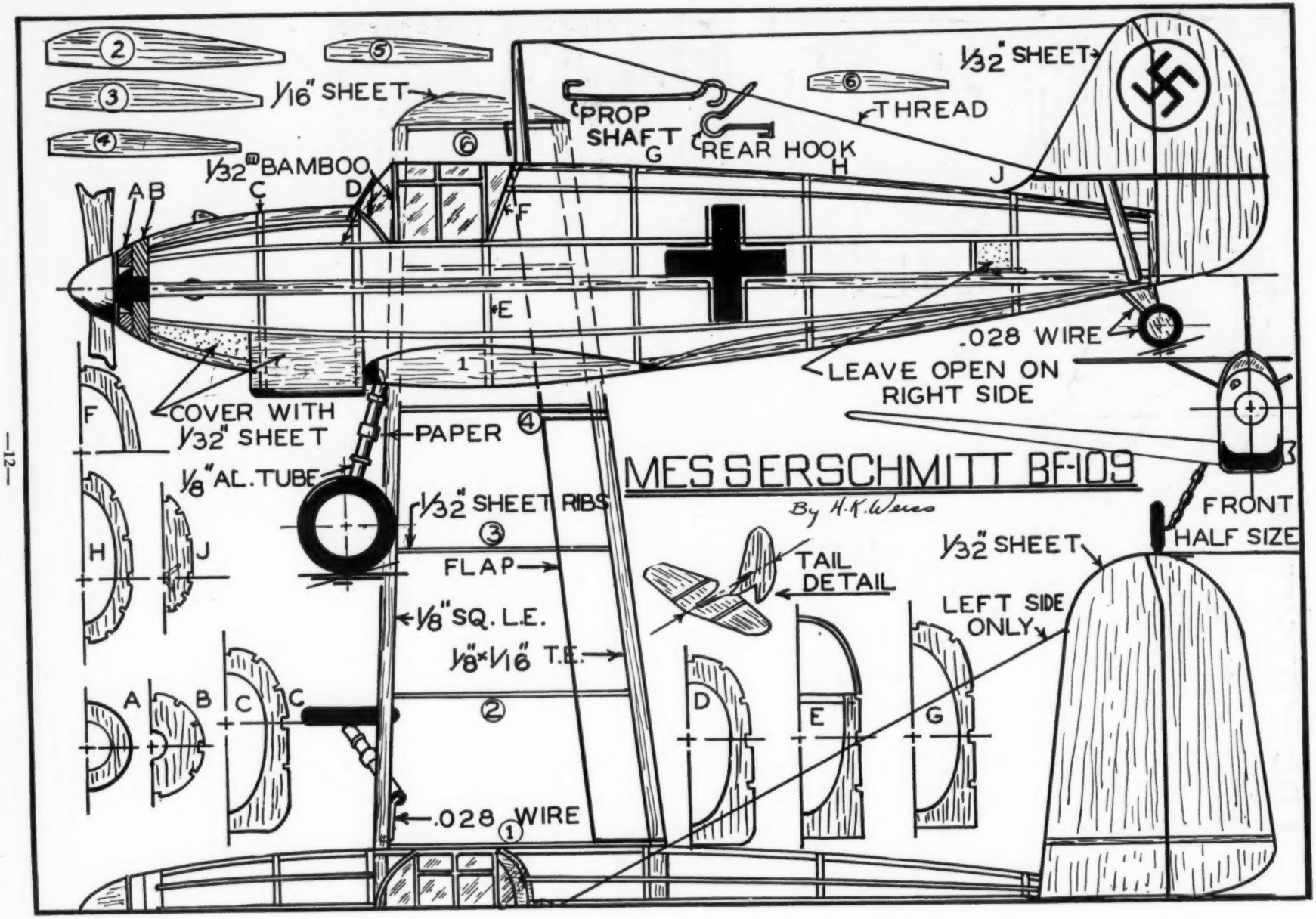
The speed represents the distance flown over in a specific interval of time without any specific reference to the general course of the flight. For example: If the DC-3 Airliner flies 600 miles in 3 hours, 10 minutes, what is the velocity? The velocity and air speed are inter-changeable terms.

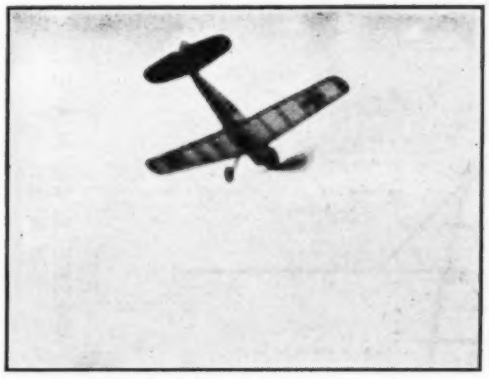
Solving: $= \frac{600}{3.16} = 189.8$ miles per hour

Note: 3 hours, 10 minutes, equals $\frac{190}{60}$ minutes or 3.16 hours.

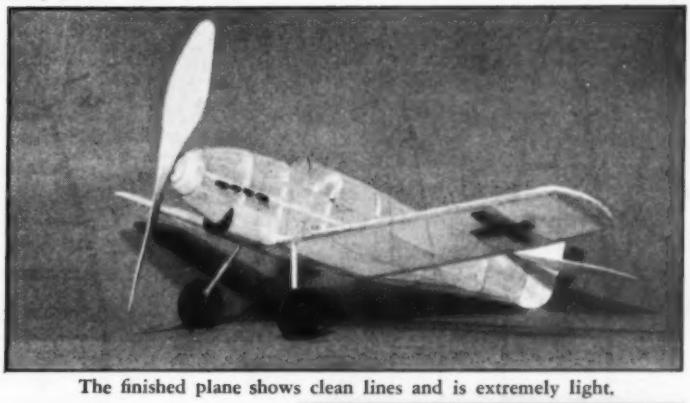
Aircraft in flight operations are subject to constant and variable velocities, as the case may be. The machine may be said to have a "constant" velocity when it flies a specific distance in a specific passing of time. The magnitude of this velocity is determined by the distance flown in the unit time as the previous problem explains. When the airplane flies over unequal distances in equal intervals of time it can be said to possess a "variable" velocity. The average velocity is that constant speed which permits the machine to fly from one terminal to another terminal in the same duration of time which is required when the air speed is variable in its value. In the previous problem, it can be seen that the airline distance divided by the time, gave an average velocity equal to 189.8 m.p.h. This is the same as saying that the DC-3 would fly 600 miles if its velocity were a constant quantity instead of the variable velocity, which it actually does fly at. To explain this: In taking off the machine has to develop its take off speed from a standing start. This means that its for-

(Continued on page 38)


2
5
3
1/16" SHEET
4
6
1/32" BAMBOO
C
D
AB
F
E
1
PROP SHAFT
G
REAR HOOK
H
THREAD
1/32" SHEET
J
.028 WIRE
LEAVE OPEN ON RIGHT SIDE
COVER WITH 1/32" SHEET
PAPER
1/8" AL. TUBE
1/32" SHEET RIBS
FLAP
1/8" SQ. L.E.
1/8"×1/16" T.E.
.028 WIRE
MESSERSCHMITT BF-109
By H.K. Weiss
TAIL DETAIL
1/32" SHEET
LEFT SIDE ONLY
FRONT HALF SIZE
A
B
C
C
D
E
G



The model in flight shows excellent stability.



The finished plane shows clean lines and is extremely light.

Build the Messerschmitt Minute Model

How You Can Build a Flying Replica of the World's Fastest Land Plane in One-Half the Time Usually Required

By HERBERT K. WEISS

OFFICIALLY the fastest landplane in the world, the B.F.W. (formerly Messerschmitt) BF-113, which holds the record of 379.7 miles per hour, is a cleaned up version of the standard BF-109 fighter of the German air force. The extreme versatility of the BF-109 is illustrated by its record of achievements. At the 1937 Zürich International Flying Meeting, the Climb and Dive Competition was won by a BF-109 powered by a 950 hp. Daimler Benz engine, when it took off, climbed to 9840 feet, and then dove to below 400 feet in just 2 minutes and 5.7 seconds. Nor is the ship handicapped by low cruising range, for the Circuit of the Alps Event for single planes and for groups of three was won in both classes by BF-109's. The BF-109 is of all metal, flush riveted, stressed skin construction, and uses both slots and flaps to maintain a low landing speed.

The model is a faithful duplicate of its prototype, and because of its slim clean lines is a very smooth performer.

Wing and Tail

Begin the construction with the wing, which is made in one piece. It may be assembled on the plan, transferring dimensions to the left panel with a ruler or dividers. When the cement has dried, crack the spars just outside rib 1, and give the wing 3/4" dihedral on each side, then re-cement the spars. Sand leading and trailing edges to shape.

Cut the tail surfaces from 1/32" sheet balsa and sand smooth. Note the way in which they are slotted so as to lock together. Cement a 1/32" x 1/16" stiffener on top of each side of the stabilizer to prevent warping.

Fuselage

Make two of each bulkhead halves and cement corresponding halves together. Formers C to J are 1/16" sheet balsa, and A and B are 1/8" sheet. Cut A to fit the bearing button.

Cement bulkheads D, E and G to the center section of the wing as shown on the plan. Add the main 1/16" x 1/8" side stringers, and cement the remaining bulkheads to these stringers. Top and bottom stringers are 1/16" square balsa, or cut from 1/16" sheet if the curve is too sharp to bend. Remaining stringers are 1/32" square bamboo. See the pictures for details. Put the rear hook in place. The projecting prong is to simplify rubber installation.

Assembly and Covering

Sand the frame carefully to eliminate projections and irregularities. Cover the radiator and the panel in front of it with 1/32" sheet balsa. Assemble the landing gear and cement it in place. Use thin 3/4" hardwood wheels. Cover the model carefully with tissue, using small strips on the curved parts of the fuselage. Cement the tail surfaces in place, being careful to have them lined up correctly. Spray the tissue lightly and allow to dry. Sand off rough edges. Add details.

Propeller

Carve the propeller from a block of hard balsa 4-3/4" x 7/8" x 5/8". The spinner may be cut to fit from a block of balsa 5/8" x 5/8" x 3/8". Be sure that there is sufficient clearance between the spinner and former A so that the prop will not rub.

Doping and Insignia

The original BF-109 has military camouflage, the top of the wings and tail and the top and sides of the fuselage being colored brown and green in large irregular patches. The underside of the ship is all gray. It is suggested that in the interests of good flying qualities the model should be given only one thin coat of dope. Coloring, if desired, can be accomplished by originally covering the plane with colored tissue.

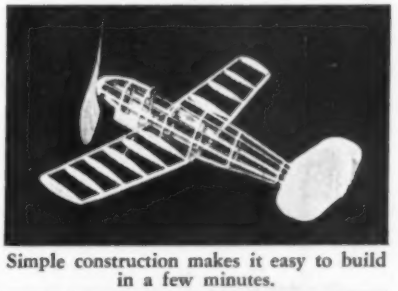
Paint a black cross on the top and bottom of each wing tip and on each side of the fuselage and a swastika on each side of the rudder.

Flying

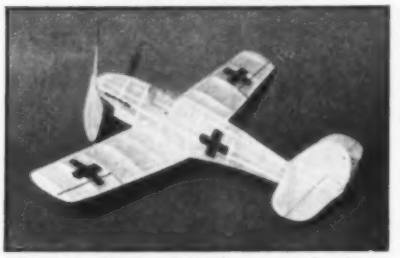
The model performs very well on two strands of 1/8" rubber, and will fly on less.

(Continued on page 51)

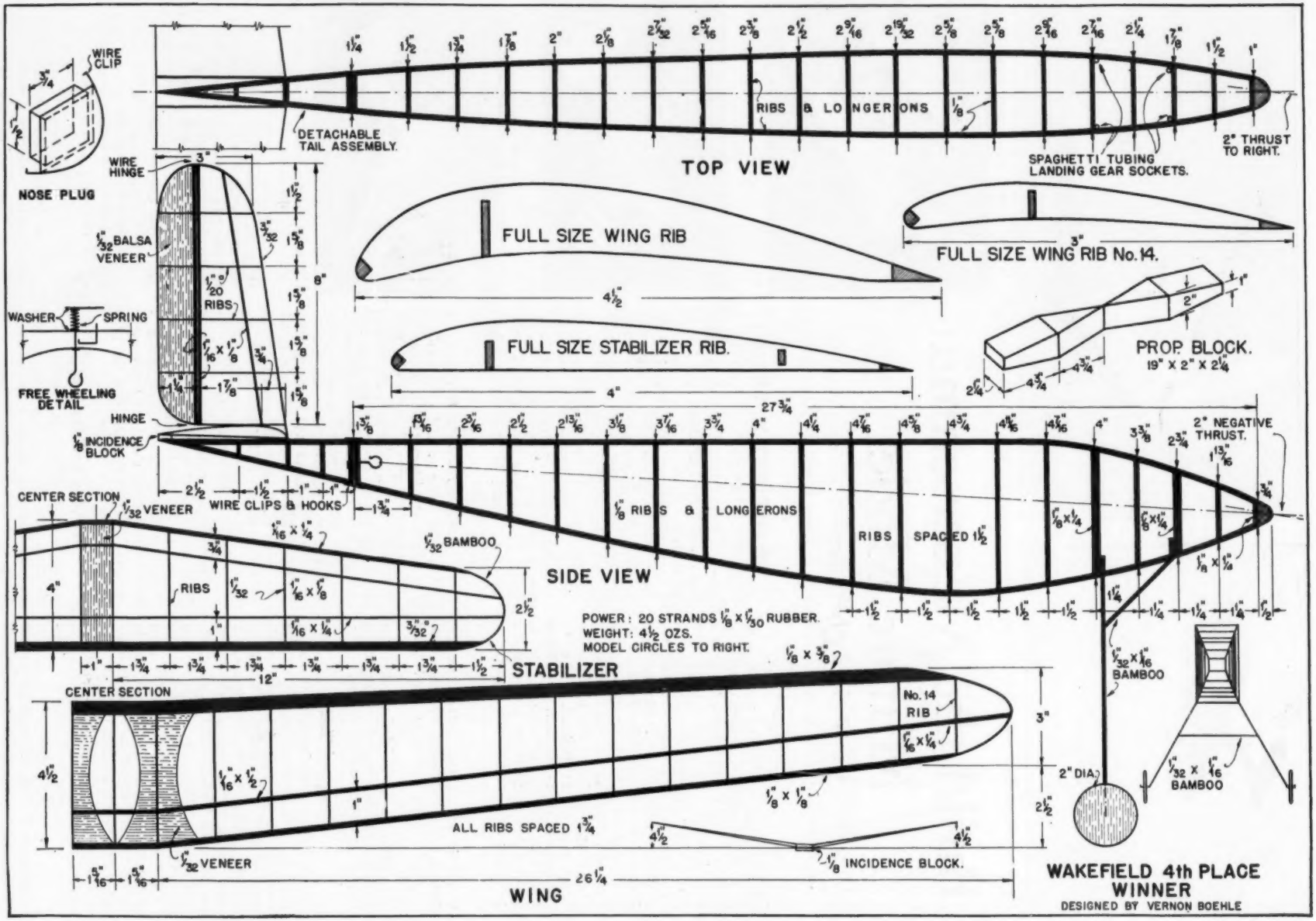
The large propeller insures long steady flights.



Simple construction makes it easy to build in a few minutes.



The balsa sheet tail surfaces are simple to make but efficient.


WIRE CLIP
NOSE PLUG
WIRE HINGE
DETACHABLE TAIL ASSEMBLY.
TOP VIEW
RIBS & LONGERONS
SPAGHETTI TUBING LANDING GEAR SOCKETS.
2° THRUST TO RIGHT.
FULL SIZE WING RIB
FULL SIZE WING RIB No. 14.
FULL SIZE STABILIZER RIB.
PROP. BLOCK.
19" X 2" X 2¼"
1/32 BALSA VENEER
1/20 RIBS
WASHER
SPRING
FREE WHEELING DETAIL
HINGE
1/8 INCIDENCE BLOCK
2" NEGATIVE THRUST.
WIRE CLIPS & HOOKS
CENTER SECTION
1/32 VENEER
1/32 BAMBOO
RIBS
1/8 RIBS & LONGERONS
RIBS SPACED 1½
SIDE VIEW
POWER: 20 STRANDS 1/8" X 1/30 RUBBER.
WEIGHT: 4½ OZS.
MODEL CIRCLES TO RIGHT.
STABILIZER
CENTER SECTION
No. 14 RIB
ALL RIBS SPACED 1¾
1/8 INCIDENCE BLOCK.
1/32 VENEER
WING
2" DIA.
1/32 X 1/16 BAMBOO
WAKEFIELD 4th PLACE WINNER
DESIGNED BY VERNON BOEHLE

The Seversky Super-Clipper

The Plane on the Cover

By DAVID C. COOKE

The Seversky transoceanic air liner of the future, as it will appear over the Atlantic.

ON DECEMBER 9th, 1937, Pan American Airways announced that they were open for bids on transoceanic aircraft that would fill the present needs of a high payload, reasonably high cruising speed and a long cruising range. In his personal letters to Boeing, Douglas, Sikorsky and Martin Aircraft, Mr. Juan T. Trippe, president of Pan American, specified that the bids would be open only for ships having a payload capacity of 25,000 pounds and a cruising range of 5,000 miles, at a minimum cruising speed of 200 miles an hour, with stateroom accommodations for at least 100 passengers.

Colonel Alexander P. deSeversky apparently thought that this was too good an opportunity to pass up, and accordingly set his staff of 174 engineers to work on plans of his ideas for a "Super-Clipper." The work was soon completed, and the new "brain child" received more attention from the newspapers than did any of the major companies that were officially invited to submit plans and specifications.

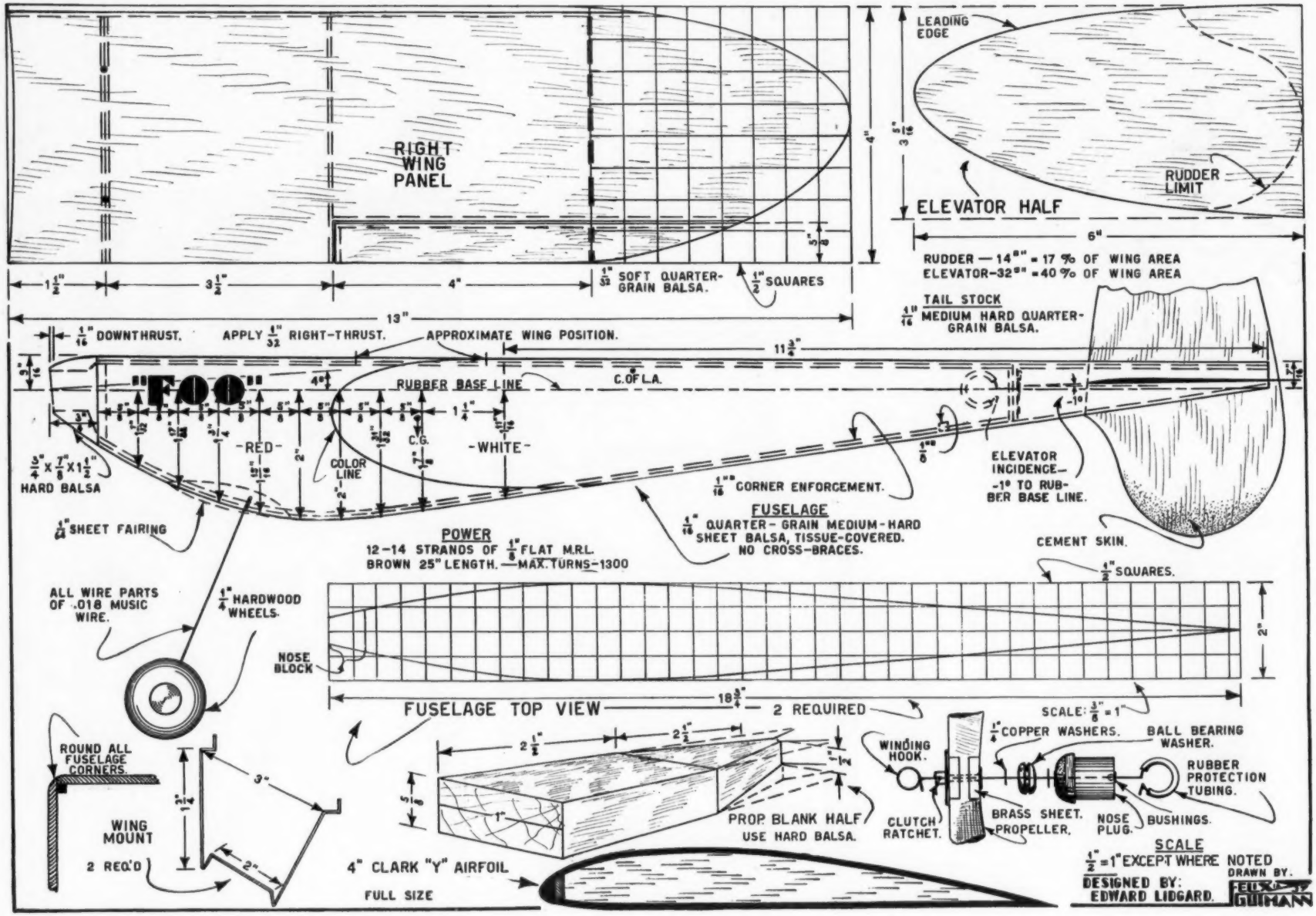
The Super-Clipper is a high wing monoplane, and is designed for shot-welded stainless steel construction. It will be powered by eight liquid-cooled Allison engines, each rated at 2,000 horsepower and developing 2,300 horsepower for takeoff, or a total of 18,400 horsepower. They are completely housed in large nacelles that can comfortably accommodate two mechanics, so that servicing and repairs can be efficiently carried on while in flight. The engines will be geared so that the two forward power plants and the central one aft are each comprised of two engines, coupled to a single propeller. This decreases torque and the area of disturbed airflow over the wing, and permits the use of very large diameter airscrews. In addition, along the trailing edge of the wing are two more power plants, each equipped with a single engine and a three-bladed, constant speed, controllable pitch propeller.

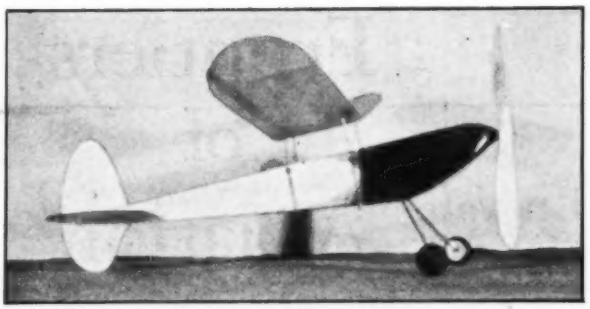
Colonel Seversky examines a model of his proposed huge transoceanic clipper.

The super-clipper loading at its dock. 1. Dining salon and promenade; 2. Cocktail lounge; 3. Control bridge and officers' quarters; 4. Forward wing staterooms; 5. Fuselage staterooms; 7. Inboard wing staterooms; 8. Starboard forward engine compartment; 9. Center aft engine compartment; 10. Galley; 11. Crew quarters; 12. Cargo space; 13. Landing gear.

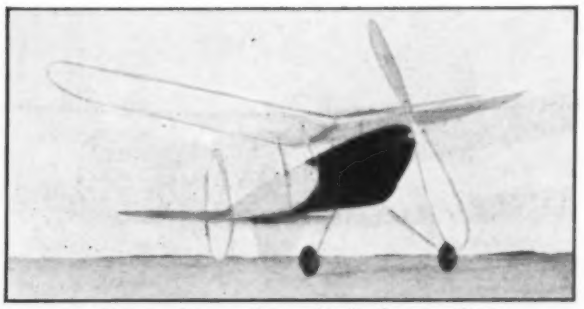
The Super-Clipper has a huge flying wing of 250 foot span, attached to which are two large fuselages which house retractable landing pontoons and support the tail surfaces. These retractable pontoons reduce parasitic drag to a minimum, and are an important contributing factor to the remarkable speed characteristics that this plane holds over other ships of the flyingboat type. By means of these retractable pontoons, the Seversky combines all the safety and advantages of a flyingboat in transoceanic service with the higher efficiency and performances of landplanes. A hydraulic mechanism on the pontoons performs the dual functions of a retracting device and of a

(Continued on page 42)


RIGHT WING PANEL
LEADING EDGE
RUDDER LIMIT
ELEVATOR HALF
RUDDER — 14 sq in = 17 % OF WING AREA
ELEVATOR-32 sq in = 40 % OF WING AREA
TAIL STOCK
1/16" MEDIUM HARD QUARTER-GRAIN BALSA.
1/32" SOFT QUARTER-GRAIN BALSA.
1/2" SQUARES
1/16" DOWNTHRUST.
APPLY 1/32" RIGHT-THRUST.
APPROXIMATE WING POSITION.
RUBBER BASE LINE
C.OF L.A.
C.G.
-RED-
-WHITE-
COLOR LINE
3/4" X 7/8" X 1 1/2" HARD BALSA
1/4" SHEET FAIRING
1/16" CORNER ENFORCEMENT.
FUSELAGE
1/16" QUARTER-GRAIN MEDIUM-HARD SHEET BALSA, TISSUE-COVERED. NO CROSS-BRACES.
ELEVATOR INCIDENCE— -1° TO RUBBER BASE LINE.
CEMENT SKIN.
POWER
12-14 STRANDS OF 1/8" FLAT M.R.L. BROWN 25" LENGTH. —MAX. TURNS-1300
ALL WIRE PARTS OF .018 MUSIC WIRE.
1/4" HARDWOOD WHEELS.
NOSE BLOCK
FUSELAGE TOP VIEW
2 REQUIRED
ROUND ALL FUSELAGE CORNERS.
WING MOUNT
2 REQ'D
PROP BLANK HALF
USE HARD BALSA.
4" CLARK "Y" AIRFOIL
FULL SIZE
WINDING HOOK.
1/4" COPPER WASHERS.
BALL BEARING WASHER.
RUBBER PROTECTION TUBING.
CLUTCH RATCHET.
BRASS SHEET. PROPELLER.
NOSE PLUG.
BUSHINGS.
SCALE: 3/8" = 1"
SCALE
1/2" = 1" EXCEPT WHERE NOTED
DESIGNED BY: EDWARD LIDGARD.
DRAWN BY. FELIX GUIMANN



It embodies fundamental high performance qualities.

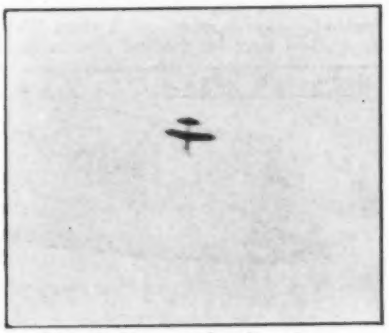


Construction requires only simple operations.

A High Performance Flyabout

Here Is an All Balsa "Experimental" Model That Gives Contest Performance Though It Is Easy to Build

By E. LIDGARD



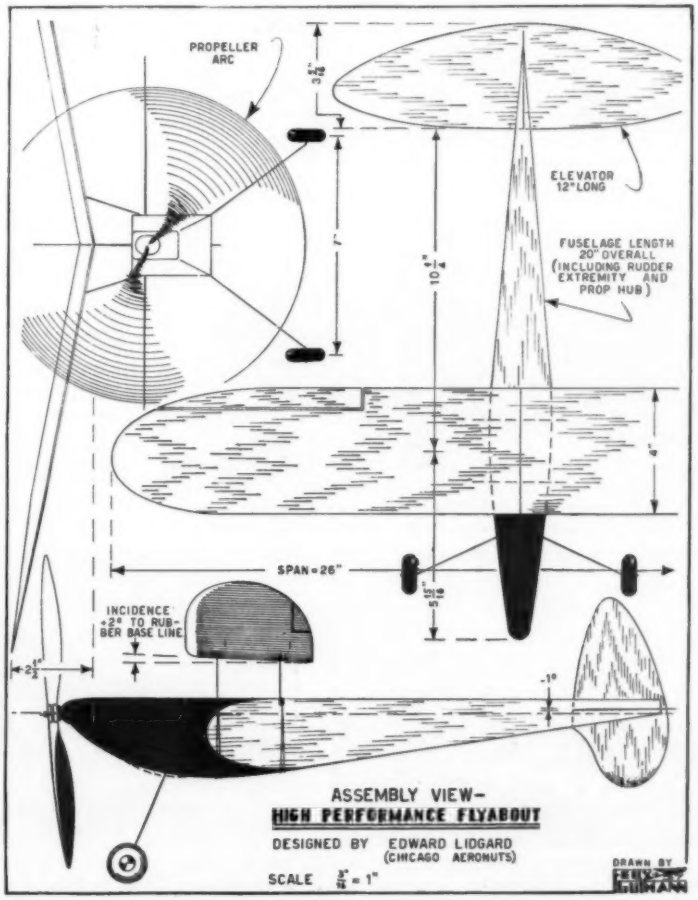
Here it is, up and going places.

EVERY fellow who follows this fascinating hobby of ours has some pet ship. It may not be streamlined, it may not be beautiful to look upon, but it flies! It may be battered and worn, but from past experience it has proven that irregardless of weather or time, it can be flown at a minute's notice. The plane presented here is my favorite. The original lasted almost two years during which time it served as an experimenter for various ideas. Its last flight was made while waiting for a part to dry on a Wakefield model. It disappeared into the blue, after six minutes, over the Chicago Municipal Airport. A few days later, Foo II" was built. It also is a good consistent flier.

Whether you are a beginner or a consistent contest placer, you will enjoy building and flying this simple ship. Incidentally, it won't take much time to build. With any past experience at all, eight or nine hours should be sufficient. As for cost, 75c will cover everything.

Most builders who do a great deal of flying like larger ships than this one. However, this ship has performance which is directly proportional to that of a larger ship of the same wing loading. A minute and one-half to three minute flights, with 700 hand winds, are not uncommon. And with a slight amount of luck on a good day, it stands even chances of being lost.

If your interest has been aroused, let's start construction. In buying your materials, get all quarter-grained balsa, commonly called "C" stock. This cut of balsa is stiffer and does not warp, and makes far more sturdy construction and long lasting adjustments. Try also to get a hand balsa machine cut prop blank. In case of doubt in any phase of construction, make it on the sturdy side, because in order to meet the 3 oz. per 100 square inch weight rule, it should weigh 2.7 oz. Although the ship is too small for contest use, being under 100 square inches, it is a good idea to make it weight rule so as to keep in trim for flying ships which are required to meet it.



We'll start construction with the fuselage. The entire ship is of all-balsa construction. This type of construction is very strong, yet fairly light. It is very durable, easy to build and repair. To lay out the fuselage sides, templates of cardboard are first made. The top and bottom may be scaled right up from the 3/8" scale graphed view. The bottom is made 1/4" longer than the top, to allow for the curve. To lay off the sides do as follows. On a large piece of cardboard draw the base line. This is eighteen inches long. Allow a clearance of three inches on bottom and one inch on top. Now at the front extremity measure up 5/16" vertically from the line, and at the tail end of the line, construct a similar line 1/16" long. Connect the two and that takes care of the top of the body. The bottom must be plotted to get the correct curve. From

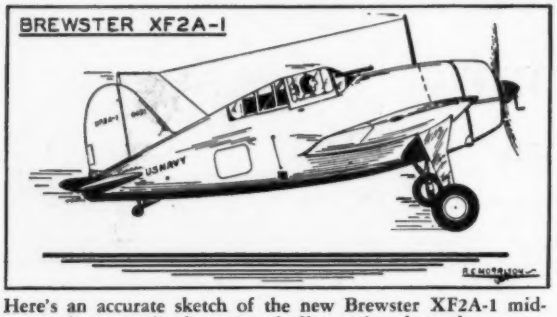
(Continued on page 40)

Frontiers of Aviation

Startling News About Foreign Pursuit Planes—Highlights of Latest Developments—How You Can Build a Scale Model of the Loire S. E. 900, France's Greatest Venture in Flyingboats

By ROBERT C. MORRISON

England's latest bomber, the Vickers Wellington, built on the Geodetic principle, on view for the first time at the Fairey Aerodrome. (Soibelman)



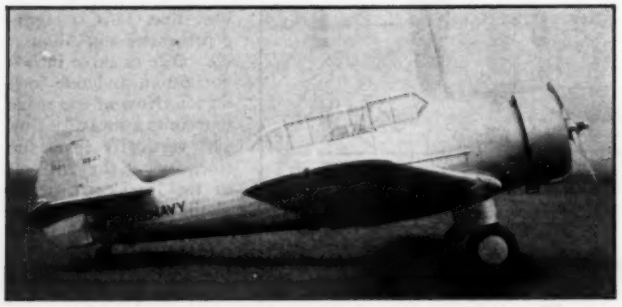
Here's an accurate sketch of the new Brewster XF2A-1 mid-wing pursuit plane, practically a winged teardrop.

The Northrop BT-1, latest dive bomber built for the navy, with flaps on upper and lower wing surfaces.

OF ALL the shipboard fighters that have been built for the U.S. Navy we like none better than the Brewster ship that has been in competition with such big companies as Seversky and Grumman. The Brewster is along the lines of the new mid-wing Grumman fighter, but in our opinion we think it is faster and has better lines. It is what you might call "of the low mid-wing type" with the typical Brewster retractable landing gear. It is a stubby, little, single place airplane powered by a Wright Cyclone and its speed and maneuverability should make any foreign power open its eyes in surprise. It is something of this type that should be able to grab the world landplane speed record—and that incidentally brings up an important point.

A certain Mr. Tinker happens to be one of the most experienced aviators who has been in the present Spanish War. He is an American and for practically every day for seven months he was a very active members of "dog fights" along the war front, flying in practically every plane available, according to his experiences recently related in the *Saturday Evening Post*. Much of Mr. Tinker's fighting experience was accomplished while flying a Russian-built Boeing P-26. These ships are different from our Boeings in that a big Cyclone is up in the nose with an added fifty horsepower put on by the Russians. Wheels are retractable, which is another big improvement. Mr. Tinker's chief adversaries were the new low-wing Messerschmitts from Germany. While in the many battles the daring American pilot found that the German ships could outdive his Boeing, but on the straight-away and in the climb the Boeing was the faster! Now, practically that same Messerschmitt holds the world landplane speed record, but still a Boeing of not very modern construction can beat it on the straight-away! As we mentioned several months ago that we could not understand how this particular German airplane ever gained the record,

The new Vance Breese Bennett twin engine transport. Its construction is unique; made of plywood impregnated with Bakelite which gives a smooth finish. (Conner)



The latest North American trainer, the N.J.-1: powered with a 550 hp. Wasp engine. (J. C. Williams)

The Lockheed "14" in which five Polish airmen took off for a 16,500 mile flight to Poland, via South America. (Acme)

A Japanese bomber in China preparing to take off on a bombing raid with full complement of bombs and guns. (Acme)

this further information leaves us in bewilderment. Could there be something which has been overlooked concerning that speed record? We know that the Messerschmitts did not turn out to be as mighty a weapon in the Spanish War as Germany had hopped they would be. They were downed on all the battle fronts.

Rearwin has something in the process of design which is a little above what the company has been doing in the sportplane line. The engineering staff has been considerably increased to speed the project.

Then we also have Stearman with a new airplane in the process of design which will be larger than any plane yet attempted by the company. It is a navy service type, not a trainer. At Douglas we have heard that engineers have been secretly working on a projected airplane for several years, which design will be of a startling nature. It is possible that this rumor may only be in regard to Douglas' recent bid to Pan-American Airways on a large flyingboat or landplane. However we have reason to believe the plane in question is a military ship.

It is now old news that Lockheed has on its books an order for twenty-nine twin-engined planes for Japan—military versions of the 14s most likely—that Lockheed has already designed military versions of the 12 and 14—and that Lockheed's next ship will have a nose wheel. However it is not generally known that the company has been working on a $70,000 plane for the U.S. Navy. But then what company is not thinking of navy business with an extra 950 navy planes about to be procured? The Airover Company has considered changing its name to Vega Airplane Co. and moving to the Union Air Terminal at Burbank, Calif. The company has been, as you know, actively engaged in the development of two Menasco engines geared to one propeller. The design must be reaching the success stage for Menasco is beginning to advertise the "Menasco Twins." Howard Hughes has been busy test flying his new Lockheed 14 and is all 'set for a long distance flight.

In the racing plane category there is Tony Le Vier and a Keith Rider job getting prepared for the coming races. Tony was one of the few pilots who cracked up at last year's National Air Races.

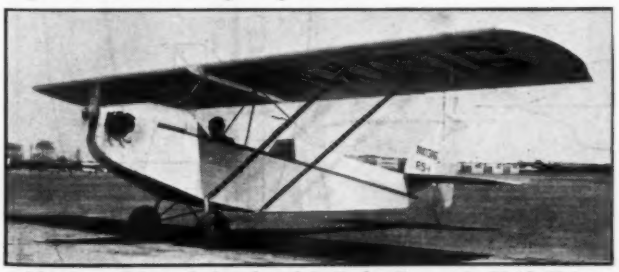
Out of Pan American

(Continued on page 43)

The Italian Cant Z-1012; one 140 hp. and two 110 hp. Alfa Romeo motors. (Kauer)

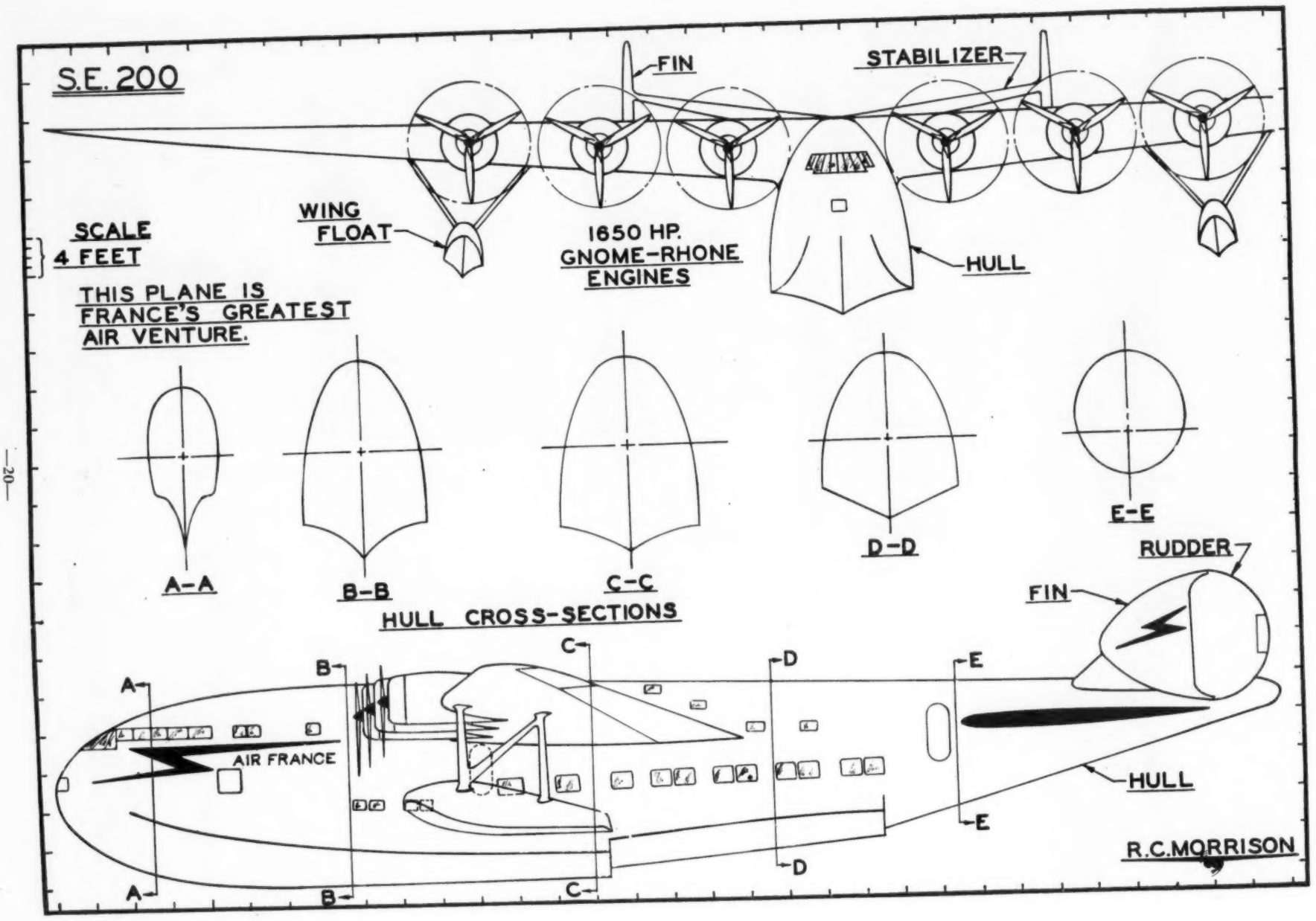
A rare picture of a Capelis "X" transport. (J. Williams from Larkins)

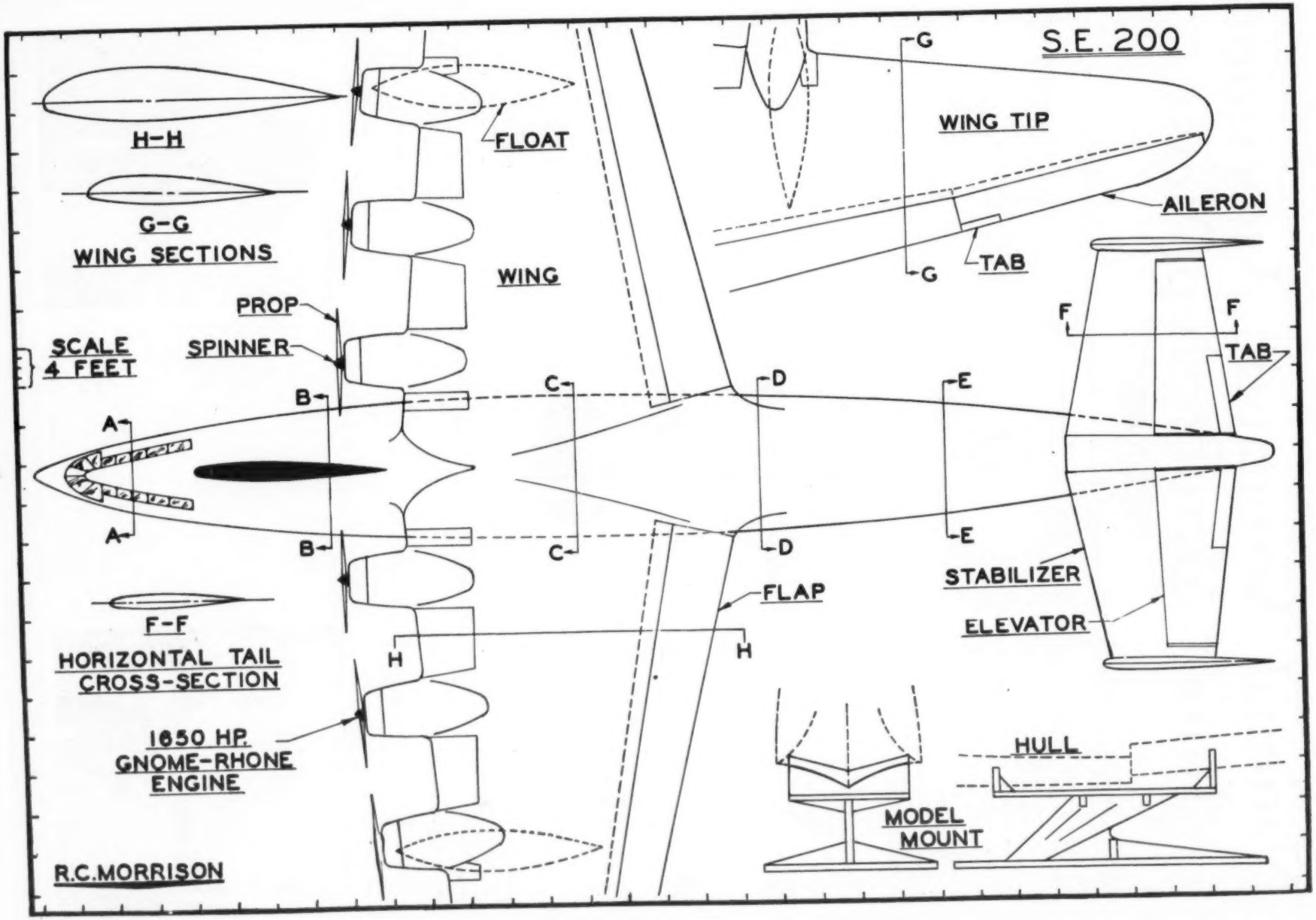
A Piper Cub with a Lenape 50 hp. engine, picking up gas on a non-stop flight, New York to Miami and return. (Intern'l)



The Ross R.S.-1, designed and built by Roosevelt Field Flying School students: powered with a Continental A-40. (Kuster)

The new Hall-Aluminum PH-2 twin engine metal patrol plane built for the U.S. Coast Guard. (Soderburg)


S.E. 200
FIN
STABILIZER
WING FLOAT
1650 HP. GNOME-RHONE ENGINES
HULL
SCALE 4 FEET
THIS PLANE IS FRANCE'S GREATEST AIR VENTURE.
A-A
B-B
C-C
D-D
E-E
HULL CROSS-SECTIONS
RUDDER
FIN
AIR FRANCE
HULL
R.C.MORRISON


S.E. 200
H-H
FLOAT
G-G
WING SECTIONS
WING
PROP
SPINNER
SCALE
4 FEET
A
B
C
D
E
F
G
H
WING TIP
AILERON
TAB
STABILIZER
ELEVATOR
FLAP
F-F
HORIZONTAL TAIL
CROSS-SECTION
1650 HP.
GNOME-RHONE
ENGINE
HULL
MODEL
MOUNT
R.C.MORRISON

National Aeronautic Association Junior Membership News

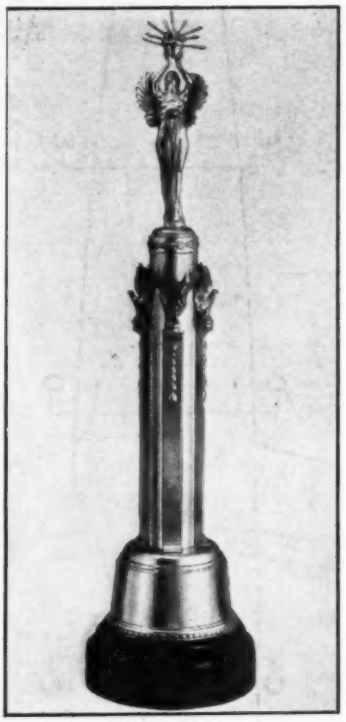
Prepared by National Aeronautic Association, Dupont Circle, Washington, D. C.

WHEN you read this, the "Nationals" will be in the course of passing into history. Hours of preparation and many sleepless nights will have come to an end. The day will have arrived on which you attain the fruits of your labor. Benefits will be accruing to you in proportion to the fidelity and skill with which you have prepared your planes and yourself for the big contest.

Of course, everyone cannot win prizes. Nevertheless, those who fail to place should not be discouraged because of this fact. There are many things which can be won at a national contest; only one of which is prizes. Some of the others are: self-respect, experience which will be of great help in attaining future success, and last but not least—friends.

We sincerely hope that every contestant who is attending the national contest receives benefits to some degree, in one or more of these phases of accomplishment.

The National Model Airplane Championships should inspire the highest degree of sportsmanship, and we hope that everyone does his part to uphold the high standards of this great event. The N.A.A. columns in the last issue helped to encourage the preparation for this contest. In the next issue the results of this national contest will be given. Therefore, this month the news editor has to "mark time" concerning the "Nationals" activities. In the interim we present some news of the varjous clubs and N.A.A. units throughout the country.



The 50 inch Exchange Club of Detroit National Model Airplane Championship Trophy, which will be presented with $200 in cash to the contestant attaining the greatest number of points at the 1938 national contest.

Boston Captures 14 National Records

Boston is going places! At an outdoor contest held April 30th at the "home of the bean," eight fliers proceeded to chalk their names in the annals of model aviation history in a total of fourteen record-making flights. There follows a listing of the record flights and the names of the fliers:

Edward Whitten, Sr., four record flights, Class D Stick HL, 1 minute, 10 seconds; Class D Glider HL, 13 seconds; Class C Glider HL, 17.3 seconds; and Class D Stick ROW, 59 seconds: Glen O'Roak, Sr., three record flights, Helicopter, 9 seconds; Class D Fuselage ROG, 32.9 seconds; and Class C Glider tow-line, 7 seconds: Gordon Cain, Sr., two record flights, Class C Stick HL, 1 minute, 32.2 seconds; Class C Fuselage ROG, 1 minute, 12.4 seconds: Hewitt Phillips, Sr., Class B, HL Glider, 43.9 seconds; Emilio Talenti, Jr., Class B Glider HL, 40 sec.; Irving Mekler, Jr., Class C Stick HL, 1 minute, 25 seconds; Edward Damahowsky, Jr., Class C Fuselage ROG, 59.2 seconds; Edward Gilcher, Jr., Class D Fuselage ROW, 26.4 seconds.

These records were established under the new outdoor record rules, as passed by the Academy of Model Aeronautics at their meeting in conjunction with the First Model Aircraft Conference held at Washington last March. One of the most important of these rules is the one which keeps timers on the field, thereby insuring the same amount of cooperation from all timers. In the past some timers were more enthusiastic about following ships across the country than others, which of course had its effect on the time of the flight.

Jack V. Tighe, Bureau of Air Commerce, Wayne County Airport, and his plane.

MICHIGAN STATE MEET
Lansing, May 28

Handsome trophies, valuable aviation school scholarships and air trips were awarded at the Michigan State Model Airplane Contest which was held May 28th at Lansing, Michigan. The contest was directed by Col. Floyd Evans, director of the State Board of Aeronautics and Arthur Vhay of the Detroit Recreation Department.

John Baruska of Detroit won the Power Model Event with a flight of 2 minutes, 59 seconds, under the 30 second N.A.A. rules. Baruska won a Dallaire midget engine, a ground school course given by Hartung Aircraft Corp. and five student flights in a Detroit Gull glider.

Edward Naudzius of Detroit won second place and will receive an American Air Lines flight to Chicago. His time was 2 minutes, 33 seconds. Naudzius also won first prize in the Indoor Cabin Event with a flight of 4 minutes, 20 seconds, for which he received the Detroit Womens' Aeronautical Association Trophy.

George Williams of Battle Creek won second place in the Indoor Cabin Event. He received the Detroit *News* Trophy with a 3 minute, 50 second flight. Joe Nedla of Flint placed third with 2 minutes, 38 seconds.

Capt. R. A. Leavel, public relations director of the 11th national contest.

Michael Roll and his ship; Detroit's hope at the 1938 Nationals.

Clayton Elles, 2nd place winner in the Dupont event at last year's Nationals, with two of his planes.

Floyd Evans, Director of the State Board of Aeronautics, Mich., and Art Vhay, Detroit Recreation Dept. Director.

Frank Franz won the Aeronca Flying Scale Event, receiving the Baker Eberle Trophy and a Penn Central Air Lines cross-country trip, with a total of 92 points. His model flew for 45 seconds. George Olson won second place with 71 points and a flight of 13 seconds. He received the Exchange Club of Detroit Trophy. Frank Kemle placed third with 52 points and a flight of 18 seconds for which he received the Michigan Department of Aeronautics Trophy.

Bob Chase of Battle Creek won the R.O.G. Stick Event for contestants under sixteen, with a flight of 6 minutes, .08 seconds. He received the Department of Michigan American Legion Trophy. George Williams of Battle Creek won the Detroit *Times* Trophy with a flight of 5 minutes, 43 seconds. Roy Barbier of Dearborn placed third with a 1 minute, .09 second flight.

This contest and another in Flint on the following Sunday, provided excellent training and practice for the national meet. It will not be surprising to learn that Michigan might take many high places at the Nationals.

Radio Used on Contest Field

Carl A. Hopkins, Contest Director for Clarksburg, W. Va., sends word of an interesting communications system in use at model meets in his locality. His club boasts of the fact that they have four amateur radio operators with five meter sets that they use as a communicating system during meets. These sets are of the trans-receiver type, which makes it possible to talk to any part of the field at any time. In this way announcements can be fed into the P.A. system from all parts of the field.

The winning national contest insignia submitted by H. A. Thomas, Little Rock, Ark.

Gulf States Model Meet Announced

The New Orleans Junior Chapter of the N.A.A. is sponsoring a Gulf States Model Airplane Meet, scheduled for July 16th and 17th to which modelers from Texas, Louisiana, Mississippi, Alabama and Florida are invited. This meet promises to be the largest ever held in the South, and with the prizes offered, compares favorably with the Nationals. Prizes at present total more than $1,500 in value. It is hoped that this event will become an annual affair.

Events scheduled are as follows:

Flying Scale; free-for-all

Endurance; Classes C and D; senior and open

Gasoline; senior and open

Exhibition Scale; free-for-all

All N.A.A. members in good standing will be eligible to participate. The contest director suggests that all model builders not N.A.A. members make application to N.A.A. headquarters, Dupont Circle, Washington, D.C.

Requests for entry blanks, information on accommodations, rules, prizes, etc., should be addressed to Mr. W. Norman, Contest Director, Gulf States Model Airplane Meet, Delgado Trades School, 615

(Continued on page 51)

Howell Enrich, general chairman of the 11th national contest.

Fill in the coupon below for membership in the N.A.A.

Use this coupon for either model membership application or for requesting NAA Gas Division application.

NATIONAL AERONAUTIC ASSOCIATION OF U. S. A.
Dupont Circle, Washington, D. C.

☐ I enclose fifty cents for annual NAA Model membership dues (use cash, check or money order) and hereby make application for Model membership in the National Aeronautic Association (age limit 21 years). There (is—is not) an NAA Model Chapter near me.

☐ Please send me the license application and pledge of the Gas Model Division of the Junior NAA (no age limit), which I must sign to become a member of the Gas Division. There (is—is not) a Gas Chapter near me.

☐ Please send me information on how to form an NAA Model Chapter and a Chapter charter application form. I enclose 10c in stamps.

Name .....
(Please print or type)

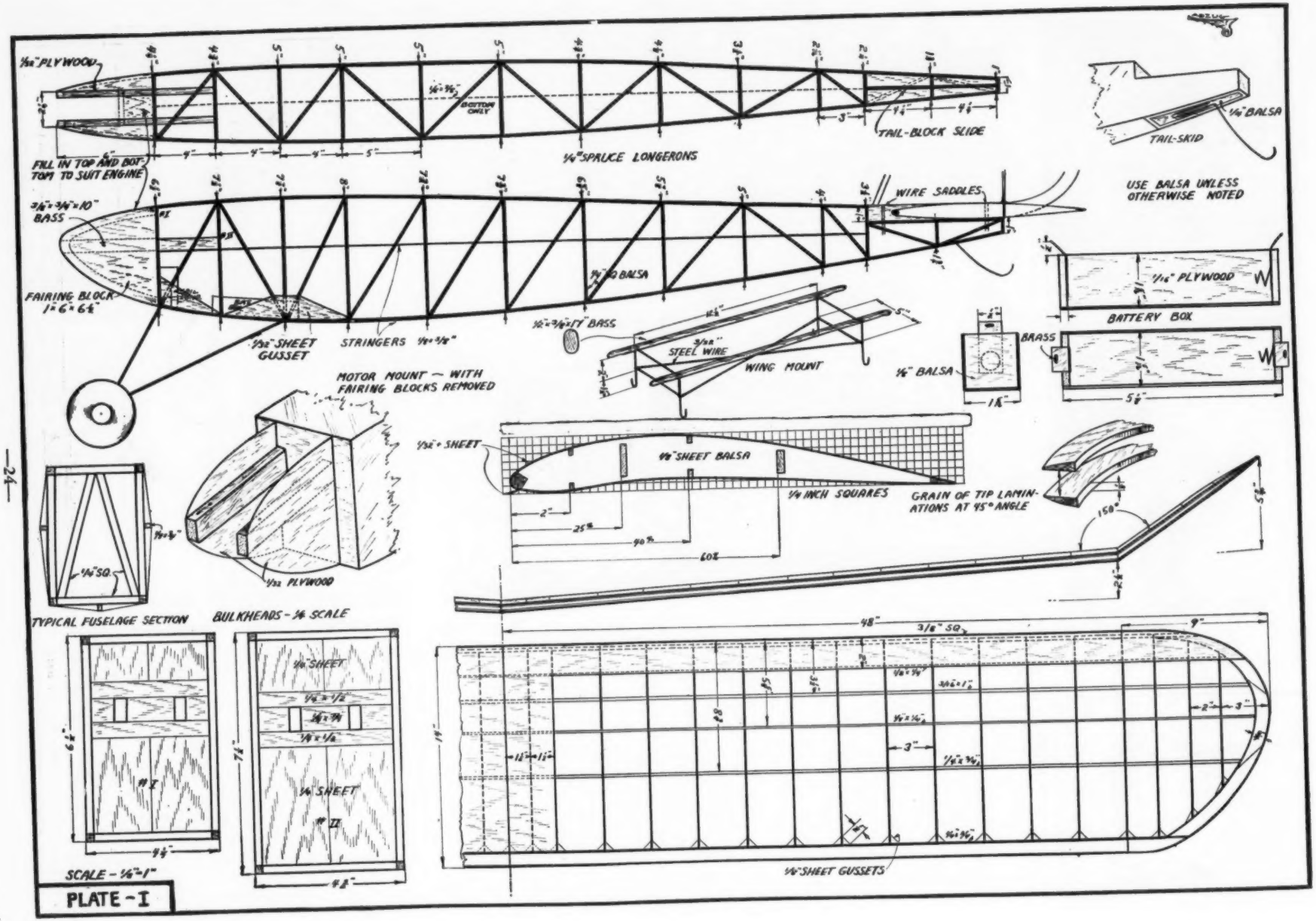
Street .....

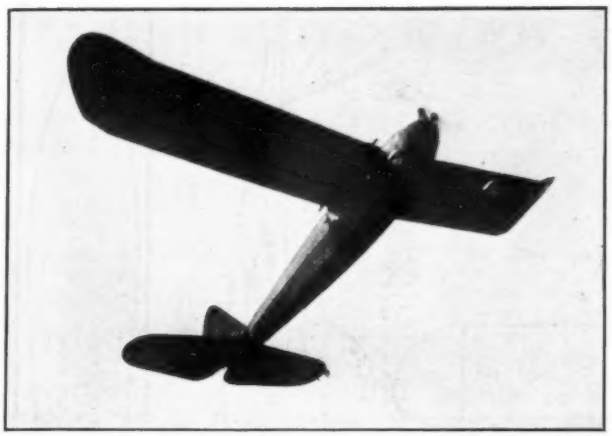
City ..... State .....

Date of Birth.....
(Month, Day, Year)

Membership application approved*.....

*(If membership application is being made and applicant is under eighteen, have parent sign here.)


1/32" PLYWOOD
1/4" SPRUCE LONGERONS
BOTTOM ONLY
TAIL-BLOCK SLIDE
TAIL-SKID
1/16" BALSA
FILL IN TOP AND BOTTOM TO SUIT ENGINE
3/16" x 3/4" x 10" BASS
WIRE SADDLES
USE BALSA UNLESS OTHERWISE NOTED
FAIRING BLOCK 1" x 6" x 6 1/4"
1/32" SHEET GUSSET
STRINGERS 1/16" x 1/8"
1/16" PLYWOOD
BATTERY BOX
BRASS
1/8" BALSA
STEEL WIRE
WING MOUNT
MOTOR MOUNT — WITH FAIRING BLOCKS REMOVED
1/32" SHEET
1/8" SHEET BALSA
1/4 INCH SQUARES
GRAIN OF TIP LAMINATIONS AT 45° ANGLE
1/4" SQ.
1/32 PLYWOOD
TYPICAL FUSELAGE SECTION
BULKHEADS - 1/8 SCALE
1/16" SHEET
1/4" SHEET
SCALE - 1/8" = 1"
1/16" SHEET GUSSETS
PLATE - I



"She picked up speed, lifted off and started to climb."

How to Build A Payload Gas Model

Complete Plans and Instructions to Build a Ship That Will Lift Three Pounds of Useful Load

By THRACY PETRIDES

Drawings by Malcolm Abzug

THE weight-lifting event at the recent Kresge contest was coming along just as anticipated—on all sides the heavily laden gas jobs were ploughing up large sections of the New Jersey landscape. That was the reason why we watched, without too much joy, the line in front of us dwindle. The PB-2 had already been weighed, and had received its payload of a pound and a half of lead. Soon our turn had come. The motor was "perking" merrily when we started her on her way. She picked up speed, (that pound and a half of lead)—lifted off and started to climb! At a little after three minutes the motor cut, but we were already straining our eyes to locate the PB-2 against the late afternoon sky. And soaring conditions were good! At fifteen minutes she rolled to a stop, miles away from the field, completing the longest official payload flight on record. In view of the excellent weight-lifting characteristics of the PB-2, this ship would seem to be the logical choice for a comparatively small, radio-controlled gas job. The PB-2 is able to lift two or three pounds of dead weight with 1/5 HP., which should be enough for a light receiving set. If, however, your set weighs more than three pounds, these plans will serve as a valuable guide towards the construction of a ten or twelve foot "transport." A successful weight-lifting gas model, whether the "payload" be lead, a radio-receiving set, or just a smooth skin finish and streamlined parts, must possess the following attributes:

1. The most obvious requirement is, of course, a high lift airfoil such as the Eiffel 431 (used on this model). A high lift airfoil is used for several purposes. First, a heavy model must travel very fast to obtain sufficient lift, and a high lift section slows the model to a safe speed. Second, this type of airfoil is necessary to supply lift to overcome the extra weight. Third, this type of section is usually thick enough to provide for deep, husky spars.

2. A good payload model must be perfectly stressed to absorb the magnified strains set up by the extra weight. For each ounce of unnecessary weight, eliminated by painstaking stress analysis, you are able to carry an ounce more of weight than the next fellow; or your model will be that much lighter, with corresponding better performance. The necessity for careful designing might be given as reason enough for the inauguration of payload contests. Each step towards the final elimination of lucky flights is in the right direction.

3. The third attribute of a good weight-lifting model is the correct placement of the payload, if the weight is in reasonably concentrated form. The common error in this direction is to place the weight too low, the model builder hoping for greater stability because of the low C.G. A very low C.G. will have just the opposite effect, causing the model to take an excessive time in recovering from disturbances. The best procedure to follow is to determine the exact C.G. of the model. At this point the weight should be placed. An exception to this method occurs when the C.G. comes out in a bad position—too high or too low. (See the "Aerodynamic Design of the Model Airplane.") The thing to do in that case is to use the weight to bring the C.G. to the proper position, actually stabilizing the model, and perhaps improving its performance!

Passing over on the way up

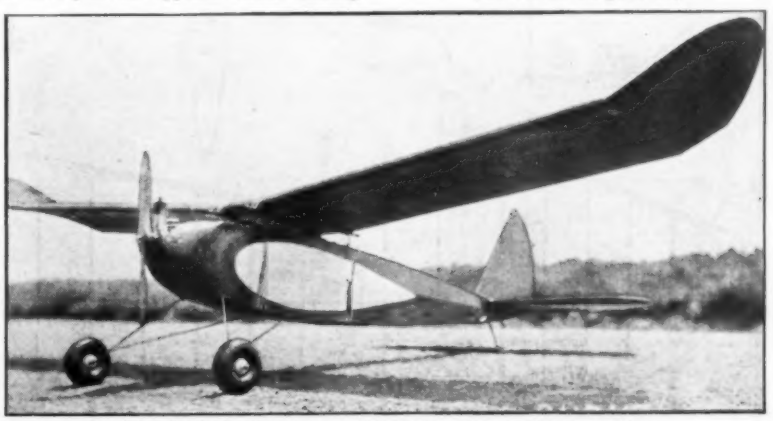
4. The model should have plenty of power for decent flights. A Brown Jr. was used with success on the eight foot PB-2, but a larger motor is necessary for a ten or twelve foot model, carrying a fair amount of weight.

There will be many gas job radio-controlled and weight-lifting events this summer, and a well constructed and intelligently handled gas job can "clean up" some of the biggest prizes ever offered.

Fuselage

The fuselage is built in the conventional manner, two sides connected with compression members and cross-braces. After the bare fuselage frame is completed, the motor mount is built in. The two bulkheads are built up of various sized pieces of 1/4" flat balsa, the pieces adjacent to the actual motor runners, of course, of the hardest stock;

(Continued on page 52)



The finished plane is graceful, light and exceedingly stable.

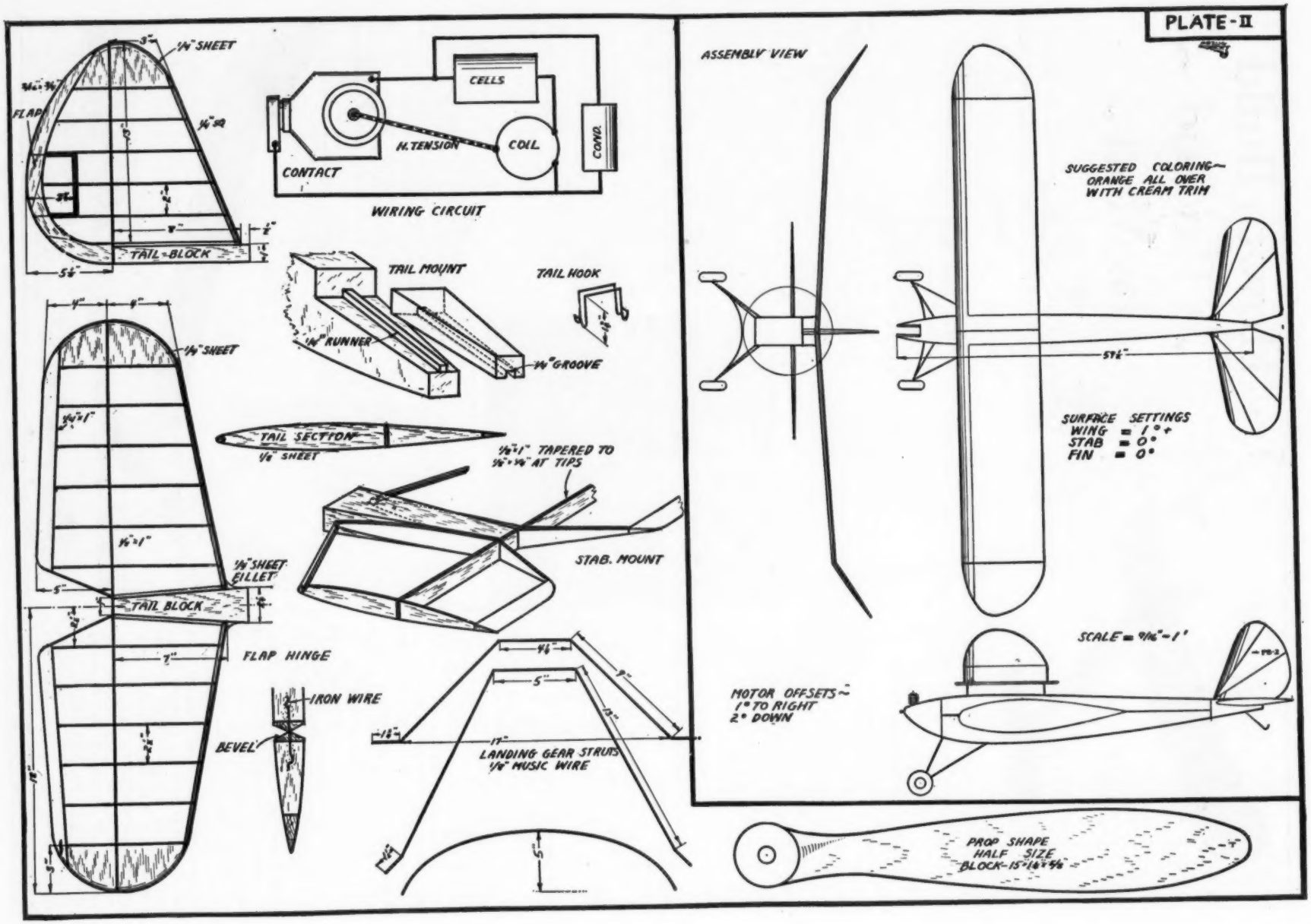


PLATE-II
1/4" SHEET
FLAP
1/4" SQ
TAIL BLOCK
CELLS
COIL
CONDR
CONTACT
WIRING CIRCUIT
TAIL MOUNT
TAIL HOOK
1/4" RUNNER
1/4" GROOVE
TAIL SECTION
1/8" SHEET
1/8"x1" TAPERED TO 1/8"x1/4" AT TIPS
STAB. MOUNT
1/8" SHEET FILLET
TAIL BLOCK
FLAP HINGE
IRON WIRE
BEVEL
LANDING GEAR STRUTS
1/16" MUSIC WIRE
ASSEMBLY VIEW
SUGGESTED COLORING—
ORANGE ALL OVER
WITH CREAM TRIM
SURFACE SETTINGS
WING = 1°+
STAB = 0°
FIN = 0°
SCALE = 9/16"-1'
MOTOR OFFSETS—
1° TO RIGHT
2° DOWN
PROP SHAPE
HALF SIZE
BLOCK-15"-16"-3/8"

Designing Your Gas Model "Prop"

Why Gas Job Propellers Differ From Those Used On Rubber Powered Planes and How to Determine the Correct Diameter and Blade Width for Any Available Power

By CHARLES HAMPSON GRANT

Article No. 76
Chapter No. 5

TO CREATE a propeller that will deliver a large percentage of the available engine power is the most involved and difficult problem that the model plane designer has to solve. Usually the designer carries through the design of his plane in an efficient manner up to the point at which he lays out the design of, or merely just "hacks out" the propeller. At this juncture it is a common fault to throw thought and care to the winds. It has become the practice of the average plane designer to go to some supply house and buy a *good looking* propeller, or to purchase a block of high quality wood, of nondescript dimensions, from which he proceeds to carve a perfect propeller from the standpoint of craftsmanship. He may even go so far as to finish it with filler and a number of coats of varnish, lacquer or other beautifying ingredients. This is particularly true when the propeller is to be used on a gas model, with which type this article is particularly concerned.

Great surprise and consternation is invariably the result of such a procedure, when the plane does not show evidence of the expected power and climb, unless "Dame Luck" smiles on the erring model fan. Only too often, in such cases, designers look for the causes of the difficulty in factors for which they are not responsible. The motor usually gets the blame. Probably this is only human. However this attitude of lack of self-criticism often obscures the real cause of trouble. The designers who are most likely to obtain efficient results in respect to propellers, are those who approach the problem of propeller design with care and respect.

A large measure of poor gas model performance originates with the attitude of the designer that all he has to do in order to make an efficient "prop" is to create one which is beautifully carved, shaped and finished. Some even do not feel that this is necessary. Another misleading situation is one in which the finished propeller, when tested, delivers a high static thrust (thrust when the propeller is not moving forward). Actually the propeller should deliver its maximum power when it is pulling the plane in flight at its maximum climbing rate. This is a horse of an entirely different color.

The all important point that is being overlooked in all such cases is the fact that the propeller must be *designed* (not built) to transmit the power of the engine most efficiently at the maximum climbing speed of the plane, and at the normal number of revolutions per minute generated by the motor. The minimum level flight speed of any plane has a direct bearing on the rate at which it will climb with any given amount of power, and therefore upon the design of the propeller. Obviously then, planes which fly normally at different speeds cannot have propellers of the same design. This could be done only if the power could be changed in each case to create the correct number of propeller revolutions per minute to give maximum pro-

(Continued on page 62)

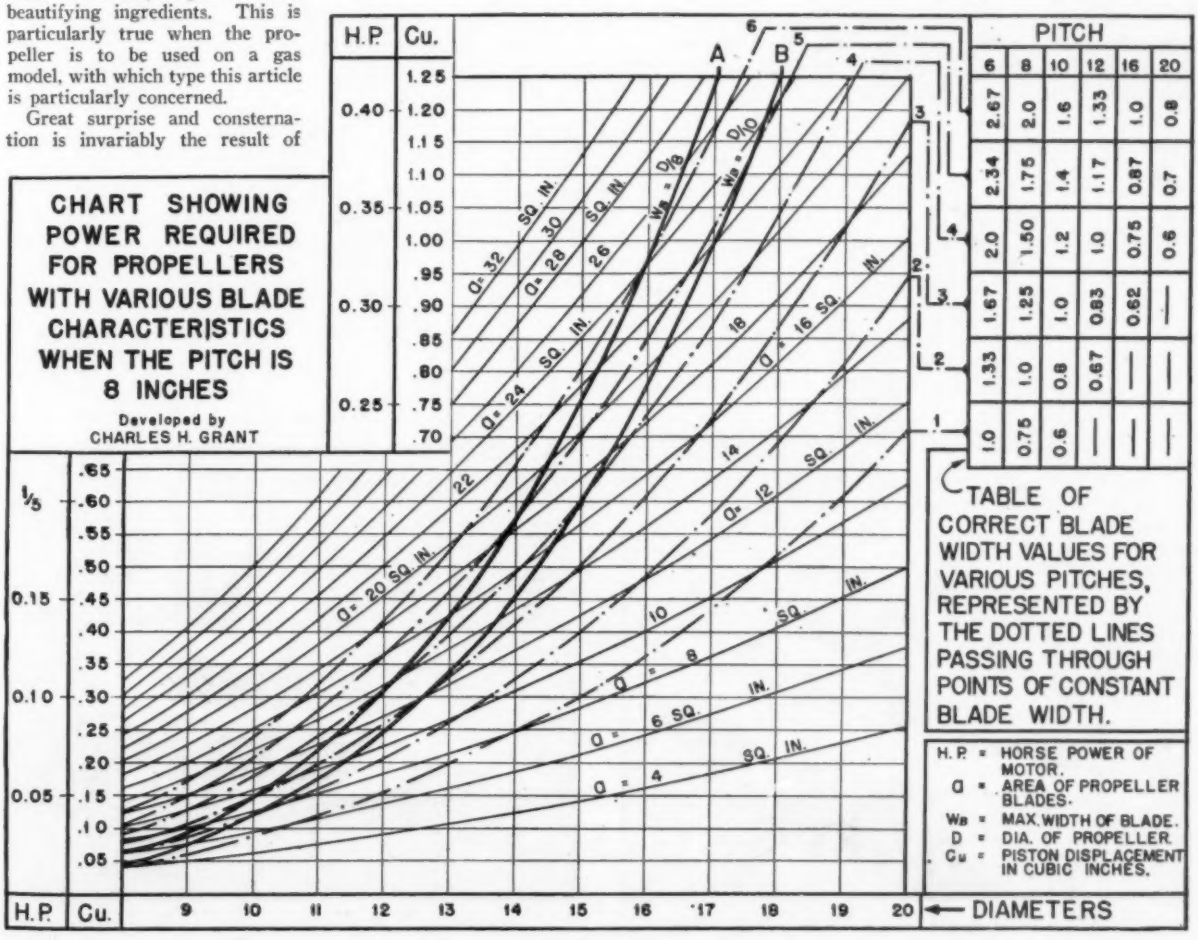


CHART SHOWING POWER REQUIRED FOR PROPELLERS WITH VARIOUS BLADE CHARACTERISTICS WHEN THE PITCH IS 8 INCHES
Developed by CHARLES H. GRANT
H.P.
Cu.
PITCH
6 8 10 12 16 20
2.67 2.0 1.6 1.33 1.0 0.8
2.34 1.75 1.4 1.17 0.87 0.7
2.0 1.50 1.2 1.0 0.75 0.6
1.67 1.25 1.0 0.83 0.62 —
1.33 1.0 0.8 0.67 — —
1.0 0.75 0.6 — — —
A
B
D/8
D/10
Wb = D/8
Wb = D/10
O = 32 SQ. IN.
O = 30 SQ. IN.
O = 28 SQ. IN.
O = 26 SQ. IN.
O = 24 SQ. IN.
O = 22 SQ. IN.
O = 20 SQ. IN.
O = 18 SQ. IN.
O = 16 SQ. IN.
O = 14 SQ. IN.
O = 12 SQ. IN.
O = 10 SQ. IN.
O = 8 SQ. IN.
O = 6 SQ. IN.
O = 4 SQ. IN.
TABLE OF CORRECT BLADE WIDTH VALUES FOR VARIOUS PITCHES, REPRESENTED BY THE DOTTED LINES PASSING THROUGH POINTS OF CONSTANT BLADE WIDTH.
H.P. = HORSE POWER OF MOTOR.
O = AREA OF PROPELLER BLADES.
Wb = MAX. WIDTH OF BLADE.
D = DIA. OF PROPELLER.
Cu = PISTON DISPLACEMENT IN CUBIC INCHES.
DIAMETERS

"Gas Lines"

Official Section of the National Aeronautic Association Gas Model Division

All N.A.A.-I.G.M.A.A. Members Eligible for Membership in the Society of Gas Model Pioneers

Pict. No. 1. Grant Lippert's plane takes off at the San Diego contest.

Pict. No. 2. Turner uses a starter.

THE I.G.M.A.A. Trophy for duration with limited amount of fuel has finally been won from Maxwell Bassett. Roland Fischer of 4510 Elm Court, Denver, Colorado, is the gas model flier whom we congratulate. As many readers know, this trophy is given to the N.A.A. member of the Gas Model Division who holds the duration record for gas model flights with 1/16 ounce of fuel per pound of weight of airplane. Fischer broke Bassett's record of 23 minutes, 18 seconds, by flying his model for 26 minutes, 25-1/5 seconds. A photo of Fischer and his plane was published in the July issue.

It was announced in the last issue that the old I.G.M.A.A. members are eligible for membership in the new organization of Gas Model Pioneers. This organization will be a permanent organization, closed to membership to those who did not belong to the old I.G.M.A.A. We urge all old I.G.M.A.A. members to join this organization immediately so that their prestige and influence may be exerted in the gas model field in behalf of the advancement of the science. All that you have to do is send in your old membership card, or your name and address with verification of your membership. This verification may take the form of the name of the director of your unit, with the unit number. If you did not belong to a unit simply send in your name and address and the date on which you became a member. Each member will receive an engraved certificate of membership, which will indicate that he was a pioneer in the science of gas model development. It is a real honor to belong to this association, so do not delay in becoming a member. There are no dues. The organization will not function in any sense in the operation of gas models, it will be purely a fraternity of pioneers in gas model flying. One of the important functions of the society will be to discuss steps which will help to advance the art in the fields of design, building and operation.

Pict. No. 3. Charles Kinney and his midwing pusher. (Kulick)

With the advent of fine weather a number of contests have been staged. In fact, the "Gas Lines" section has been flooded with pictures and data of such activities. Mr. Elbert J. Weathers of 2720 Poinsettia Drive, San Diego, who is corresponding secretary of the San Diego Aeroneers, has sent us a few photographs of the third annual San Diego contest, news of which was given last month. At the head of "Gas Lines," picture No. 1, is Grant Lippert's gas job getting off to a fine start. Lippert lives in Los Angeles, Calif. The ship won eighth place in a field of 176 contestants.

Before we tell you more about contests we wish to call your attention to a device which will be appreciated by every gas model fan. Somebody has been ingenious enough to invent a starter for gas model

Pict. No. 8. Elton Ballas' model has only one wheel.

Pict. No. 9. Philip Sagona and his "Flying Tadpole."

Pict. No. 4. Shulman's model dives in. (Soibelman)

Pict. No. 5. Winners and their trophies, won at the Kresge contest. (Kulick)

engines. Picture No. 2 shows Carl Turner Jr. holding a Cadet Starter. On the end of the starter are two fingers. Within the starter is a torsion spring which spins the arm and fingers when the snap is released. It will turn the prop over six times. Turner has built six models, having been bitten by the gas model bug six years ago. Last year he won a number of prizes in contests he entered. Now, he always uses the starter when testing his models. Unquestionably every model builder will follow his example. It appears as if the crop of bruised fingers shall diminish this year.

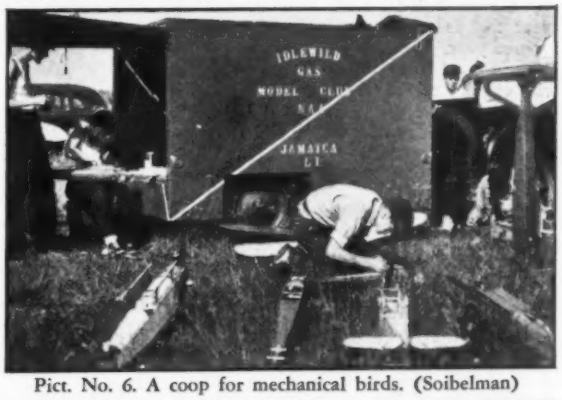
One of the important meets of the season was the fourth semi-annual contest held by the Kresge Department Store of Newark, New Jersey, at Hadley Field, on May 28th, and sponsored by MODEL AIRPLANE NEWS. A larger number of contestants were on hand than at any other contest held at Hadley Field. A record number of 250 applications was received by Ben Shereshaw, director of the meet. 75 of these entries were listed in the Small Plane Event. James Condon reports:

The contest was held under N.A.A. sanction and special permission was granted, allowing the contestants in the "small" event a 40 second motor run, and placing no restriction on the wing loading of the ships.

This latter dispensation was made due to the fact that the majority of model builders do not favor ten ounce wing loading for small models.

This was further borne out by the performance of the small models. With but few exceptions, most of the midget gas jobs appeared to be under-powered and seemed to have difficulty in climbing. This bad showing would indicate the need for a more lenient rule. We believe in lifting the weight limits on the small ships altogether, thus fostering more interest and experimentation in this field. These weight limits cannot be set arbitrarily, but must be set only after comparing performance data on various designs.

The first event was



Pict. No. 6. A coop for mechanical birds. (Soibelman)

Pict. No. 18. Jeffrey's plane that flew 61 min.

Pict. No. 10. Gutmann and his ship.

Pict. No. 11. Low and his 36 in. plane.

Pict. No. 12. Sebek with another midget.

Pict. No. 13. A few contestants at a Chicago meet sport some fine looking planes.

for models whose gross weight did not exceed seven pounds. The S. S. Kresge Trophy was awarded to the winner of this event and is to remain in his possession for one year.

The second event was for ships powered with engines of 5/8" bore or less.

Another prize was awarded at the field for the model showing the best workmanship.

The weather was perfect for model flying.

Pict. No. 14. Steve Curtiss with the smallest plane at the Philadelphia contest.

A clear blue sky with just a few scattered clouds, a warm sun and no wind. There were plenty of thermals in the early part of the day to lend a helping hand to the models, but they disappeared along toward the afternoon.

These ideal conditions resulted in a new record of 11 minutes, 58 seconds, with a 30 second motor run, by Gordon Murray of 2549 Bedford Ave., Brooklyn, N.Y.

Another idea of the power of these thermals may be gleaned from the fact that the first four places were taken by flights of over ten minutes, a 9:50 flight taking fifth place.

The best flight of the day was chalked up by Ehling, whose Elf-powered parasol made an unofficial flight of over 14 minutes on a 40 second motor run. Frank recaptured the ship undamaged and later won the Small Ship Event with a 1.31 flight.

More than half the planes in the first event were built from kits.

In our opinion too many good ships were grounded by faulty engines, due mostly to carelessness. Walter Dickenson flew a beautiful Poly-parasol. This ship appeared to be very efficient, having a steep spiral climb and a swell slow flat glide, but due to a faulty engine the plane could not climb more than thirty feet before the motor cut. This

(Continued on page 58)

Pict. No. 15. Irwin Leshner's "diamond fuselage" plane in full flight.

Pict. No. 7. Jim Wood and his scale gas model of Art Chester's racer. (Kulick)

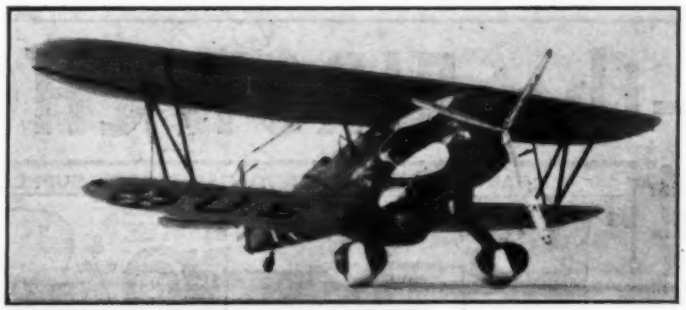
Pict. No. 16. Bob Jacobson and his winning ship.

Pict. No. 17. The Atlantic City entries at Philadelphia.

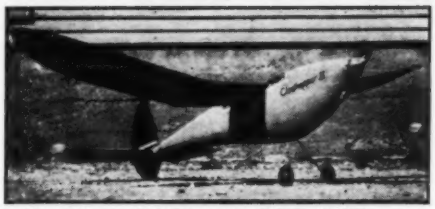
AIR WAYS

HERE AND THERE

What Readers Are Doing to Increase Their Knowledge of Aviation in All Parts of the World. Tell Others What You Are Doing

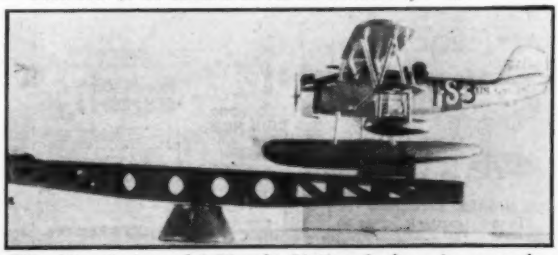


Pict. No. 1. A detail scale model of a Hawk P6-E, "that *is* a scale model," by Wm. Moser.



Pict. No. 2. Cahill's 1937 "Moffitt" Winner.

Pict. No. 3. O. Small's 15 in. scale Sikorsky S-43.



Pict. No. 4. A model Vought V-65 poised on its catapult.

Pict. No. 5. Francis Smith and three of his fine models.

Pict. No. 6. Billy Kay launches his transition model.

Pict. No. 7. V. Dornan shows here how fine "solid scales" may be made.

Air Ways Club News

THOUGH many of our Air Ways Club members "fold up" for the winter and create the impression of suspended animation, we find that they have been doing a great deal of work with their models "under cover." Many of them are now coming out with new and, in some instances, strange designs. Nevertheless progress has been made and they are now preparing their craft for the ultimate test at the National Competition in Detroit.

We hope that the Air Ways Club members have not forgotten that there is an Air Ways Trophy, and that any Air Ways Club member may win and hold it until it's won from him by some other member. This trophy is held by the member who has made the longest flight with a rubber powered model, regardless of its type. James Cahill of 215 Chauncey, West Lafayette, Indiana, now holds the trophy, having won it by making a flight of 15 minutes, 45.1 seconds, at the 1937 Nationals in the Moffitt International event.

Any Air Ways Club member who makes a flight of greater duration than this time, in a contest or in any event sanctioned by the National Aeronautic Association and timed by N.A.A. officials, is eligible for the trophy. Any contestant who does exceed this time should notify Air Ways Club headquarters, MODEL AIRPLANE NEWS, 551 Fifth Avenue, New York City, supplying complete information concerning the time, if the meet was sanctioned by the N.A.A., name of the timers, contest directors, etc. After verification of this report by the Air Ways Club director, the trophy will be passed on to the new winner.

Naturally Cahill will be reluctant to give up this trophy. However we hope that other Air Ways Club members provide a little excitement in the way of competition for it.

Considerable information concerning Air Ways Club activities has been sent to us this month. However due to interest in the coming 1938 Nationals, it has been required that we devote additional space to this great event. This makes it necessary to be brief in respect to Air Ways activities.

A creation of William Moser of 4895 Polk Avenue, San Diego, California, heads this month's column. Picture No. 1 shows Moser's Curtiss Hawk P6-E

(Continued on page 55)

Pict. No. 8. Dick Everett keeps in practice for contests.

SCIENTIFIC—the FIRST CHOI

NOW! THE SENSATIONAL *RED ZEPHYR* GAS MODEL

ONLY **$4.95** POSTPAID (Less wheels)

Complete Kit, Including 3½" Pneumatic Rubber Wheels **$5.95** POST-PAID

6 ft. WINGSPAN; 56" LONG; WEIGHT (Less Motor) 2½ Lbs.
HOLDER OF PRESENT CHAMPIONSHIP OF FRANCE

A RELIABLE GAS MODEL AT A REASONABLE PRICE. THE ONLY LOW PRICED MODEL WITH ALL THESE VITAL FEATURES:

PRECISION BUILT! Accurate, fully detailed, full size drawings and complete instructions.

QUALITY FEATURES! Simple and highly efficient aerodynamic design with low wing loading.

PERFORMANCE! Takes off from the ground unassisted in about 15 feet, climbs beautifully, and lands perfectly.

SPECIAL FEATURES! Full shock-absorbing landing gear with new type, easily attached brackets. Vibration absorbing motor mount. Reinforced nose and hood to protect motor. Wings quickly demountable for easy transportation.

IT CONTAINS EVERYTHING, BEING 100% COMPLETE

GUARANTEED SCIENTIFIC GAS MODEL SUPPLIES

SCIENTIFIC GAS MODEL FINISHES

Clear Nitrate Dope, Colored Nitrate Dope, Nitrate Thinner, Gas Model Cement, Regular Cement, Bamboo Paper Cement, Banana Oil.

3 oz. bottle	$ .25
½ pt. can	.50
1 pt. can	.75
1 qt. can	1.40

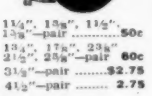
NOW SYNCRO ACE ONLY

$13.75 Postpaid

NEW! SELF-STARTER
Cranks your model engine for you. No boosters or batteries needed. Simple, positive, safe! Press the button and your motor runs.
$3.00 Postpaid

AUTHORIZED DISTRIBUTORS M&M

1¼", 1⅜", 1½", 1⅝"—pair	50c
1¾", 1⅞", 2⅛" 2⅜", 2⅝"—pair	60c
3½"—pair	$2.75
4½"—pair	2.75



CHAMPION SPARK PLUGS EACH 65c

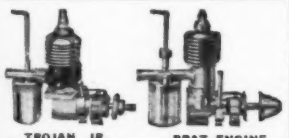
The NEW OHLSSON
With transparent cellulo... gas tank; ⅞" bo... 15/16" stroke, 500 ... 14,500 R.P.M., ⅛ H.P. Bare weight 6½ ... height 4¾", 20 min. ... 1 oz. fuel. Radial or ... mounting. Complete wi... tank, coil and condens...
Postpaid ..... $18.

CONDENSERS

No. 1 1¼" long	.20
No. 2 1⅝" long	.20
Condenser with mounting	.25
Ultra light condenser	.25
Brown, Jr. Coil	3.50
Firecracker Coil	2.50

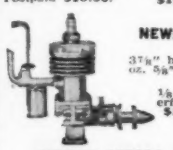
SCIENTIFIC BROWN RUBBER
More winds, more power, more duration.

		flat skein	
1/16"	3 ft.	.01:	.65
3/32"	3 ft.	.01:	.75
⅛"	2 ft.	.01:	.80
3/16"	1 ft.	.01:	95



TROJAN JR.
3½" High, ⅝" Bore, ⅛ H.P. Light Weight — Powerful. Postpaid **$18.50.**

BRAT ENGINE
3¼" High, 15/32" Bore, ½" Stroke, 1/10 H.P. Postpaid **$16.50.**



NEW! BAT ENGINE
3⅞" high. Weight 4½ oz. ⅝" Bore and stroke.
⅛ H.P. Light, powerful.... Complete **$12.50** postpaid.

OTHER SMALL ENGINES

Husky Jr.	$12.50	Condor	$18.50
Pee Wee	14.50	Elf	21.50

Engines are complete, ready to run, including coil, condenser, propeller, oil, and instructions.

GAS MODEL BALSA STRIP BALSA
5 Foot Lengths

⅛x¼	.02
⅛x¼	.04
⅛x⅜	.06
⅛x⅜	.04
3/16x3/16	.06
⅛x½	.10
⅛x½	.10
⅜x⅜	.10
⅛x½	.12
1x1	.25

SHEET BALSA
5 Foot Lengths

1/32x2	.10
1/32x3	.15
1/16x2	.12
1/16x3	.18
⅛x2	.15
⅛x3	.20

FLIGHT TIMER SCIENTIFIC
$1.95 POSTPAID
REPLACE YOUR OLD COIL NOW WITH A

FIRE CRACKER COIL
$2.50 Postpaid
You'll be surprised at the new pep and power your engine has.

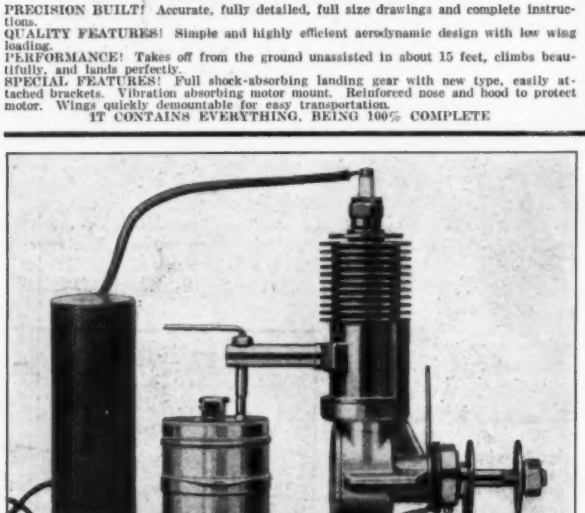
NEEDLE VALVE
All series: X, A, B, C, and D
Guaranteed. Ea. .50
MOISTURE-PROOF HOOK-UP WIRE
In pkgs. of 5 ft. .20
BROWN JR. SPARK PLUGS
Now only .65
HURLEMAN SPARK PLUG
Weight ¼-oz., ea. .75
ACCURATE FLIGHT TIMER
Each 2.50
MINIATURE KNIFE SWITCHES
2-pole switch ea. .25
3-pole switch ea. .35
VALVOLINE MOTOR OIL
Per bottle, with instructions .20
MODEL BUILDERS' TOOL KIT
A 75c value for only .50
TRU-PITCH GAS PROPS 75c Each
13", 14", 15", 16"
BALSA PROPELLERS

5"	.03:	.07
6"	.05:	.10
7"	.06:	.12

FILTER FUNNEL
Price ea. .30

PLANS
"MISS AMERICA" GAS MODEL
Set of 3 plans
"RED ZEPHYR" GAS MODEL
Complete set of 2 plans
Streamliner
Eaglet
SPRING MUSCLE WIRE
3/32" diam., 5 ft. ⅛" dia., 5 ft. 1/16" diam., 3 ft.
LANDING GEAR BRACKETS
Complete set of 5 brackets with 4 set screws.
FEATHERWEIGHT LANDING GEAR BRACKETS
Complete set of 4 stampings with 4 screws and nuts, priced low
TURNBUCKLES
Length ½" ea.
4 for
Length 1", ea.
4 for
SCIENTIFIC PNEUMATIC RUBBER WHEELS
Lightweight—Pressure Proof—8 ball Proof.
3½" pair
"ZEPHYR"
Grade A Silk, ⅜ wide, yard

ORDERING INSTRUCTIONS: 15c for postage and packing supply orders up to $1.50, and to orders over $1.50. Supply orders of $4.00 or more are postpaid. kits and motors are postpaid.



This Fine New Model D BROWN JR. ENGINE can be yours

for the Exceptionally Low Price of

ONLY **$10**

Complete, Ready to Run

POSTPAID

—IMMEDIATE DELIVERY—

Order it today from Scientific—or from your local Scientific dealer

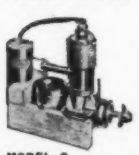
In every way, the new Brown Jr. Model D lines up with the famous Brown motors that have won first places and flight records everywhere. The same high quality metals are used, such as alloy steel cylinder with aluminum alloy piston and 2 special rings, forged aluminum connecting rod, simplified pin type conrod, and other high quality features. Not long ago you had to pay as much for a knockdown motor kit as you do now for the completely finished ready-to-run Brown Jr. precision motor. For the power delivered, the Brown Jr. motor is undoubtedly the lightest miniature gasoline motor manufactured, thoroughly tested and run under actual performance conditions. For 100% satisfaction power your model with a Brown Jr. motor. Order early from Scientific for immediate delivery. COMPLETE ENGINE READY TO RUN, INCLUDING FUEL TANK, COIL, CONDENSER, ETC., ONLY $10.00, POSTPAID.

Included at no additional cost is a motor manual containing all information on the operation and care of your engine. This manual is included with all Brown Jr. engines.

GENERAL SPECIFICATIONS

7/8" Bore, 1" stroke; 1,200-10,000 R.P.M.
Height 4½", 1/5th Horsepower.
Actual scale weights: Bare motor ..... 6½ ozs.
Complete with coil, tank, and condenser (as furnished) ..... 11½ ozs.
Ready to run, with gas, two batteries, and propeller ..... 20½ ozs.
Two standard 1½ volt flashlight cells required for current.

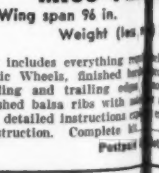
DOUBLE GUARANTEE
Buy your gas engine from SCIENTIFIC and you will be protected by the double guarantee—guaranteed by the factory and again by SCIENTIFIC.



MODEL C
Offers the proven advantages of the Brown Jr. motor at a medium price. Complete, ready to run
$17.00
Postpaid

MODEL H
Long famous for power, smooth running, and high compression. Complete, ready to run
$21.50
Postpaid

MODEL M MARINE
Built to high exacting standards for use in model boats. Complete, ready to run
$15.00
Including Flywheel
Postpaid



MISS PHILADELPHIA
Wing span 96 in.
Weight (less ...

Kit includes everything ... matic Wheels, finished ... leading and trailing edges ... finished balsa ribs with ... and detailed instructions ... construction. Complete ...
Postpaid

For any items advertised ... local dealer or order ...

SCIENTIFIC
218-220 MA-8 ... Street
In France: E. Kruger & Co. ... St., ...
In Australia: Swift Model ... Adelaide

ICE of all MODEL BUILDERS

Scientific has endeavored at all times to supply the model builder with only the best material obtainable, and to keep up-to-the-minute with the latest phases of the model building hobby.

Although Scientific gives you the greatest selection in gas models that can be found anywhere, the gas model line is only one phase of Scientific's leadership. New up-to-the-minute features are included in the entire line—no item is small enough to be overlooked.

It is this alertness to all latest developments of the model field that has made Scientific the first choice of all model builders, not only in the United States, but throughout the world.

READY-TO-FLY STICK MODELS

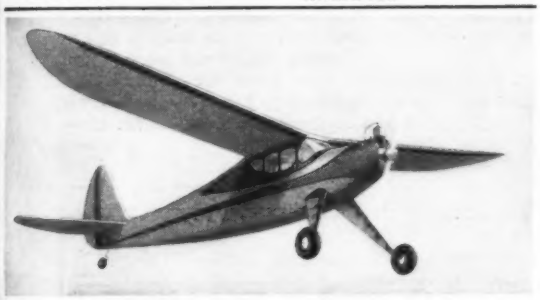
Unsurpassed for teaching the fundamentals of Aeronautics. Models of this type have been used for years in such schools as New York University, Y.M.C.A.'s, and numerous summer camps all over the U. S. All parts formed and cut, and can be assembled in a very few minutes. Flies from 300 to 500 feet, 2 to 3 minutes. Complete Kit..... **25c**

GUARANTEED FLYERS—15 in. WINGSPAN

Three of the country's most popular sport planes—planes that you can see at almost any airport, and which never fail to show fine performance.

Your choice of MONOCOUPE WACO TAYLOR CUB **25c** EACH

TAYLOR CUB



A NEW SMALL GAS MODEL

DESIGNED FOR USE WITH SMALL GAS ENGINES

Wingspan 44" Length 32" Flying Weight with Motor 17 ozs.

The "Eaglet" is the finest small gas model in existence today. It has a climb that can be described mildly as spectacular, and a flat glide that is really sensational. Simplified so that any model builder with little or no experience can build the model easily. Requires only 1/3 the time to build that large gas models require.

KIT IS 100% COMPLETE including M & M Pneumatic Wheels; 10" semi-finished propeller; ribs, bulkheads, fairings, etc. printed on balsa; tail wheel; battery box, etc.; liquids; all required insignia; full size plans with complete information. On test flights the "Eaglet" was flown very successfully with the Brat and Trojan engines, available direct from Scientific at prices listed.

DE LUXE KIT

$3.95 POSTPAID OR AT YOUR DEALER

Including M & M Pneumatic Rubber Wheels

BY POPULAR DEMAND A NEW GAS TYPE RUBBER POWERED MODEL AIRPLANE

The "FIREFLY"

Wingspan 36" Length 28" Weight 4 ozs.

The kit is complete, including M & M pneumatic wheels with inflating tube; all formers printed on balsa; tru-pitch 10" balsa wood propeller; rubber lubricant; brown contest rubber; wire; washers; tissue; motor hooks; cement; and all necessary metal for building the ratchet motor-hum effect; full size detailed drawings with explicit instructions. A real value for only $1.95!! Order your kit now!

$1.95 Postpaid

Postpaid, including M & M Pneumatic rubber wheels

MISS AMERICA

7 Ft. DeLuxe Gas Model STILL THE NATION'S BIGGEST KIT SENSATION

Weight (less Motor) 2¾ lbs. 22 Minutes on 1 oz. 18 to 1 glide.

Kit is complete with 3½" pneumatic wheels and finished prop. If you want a reliable flyer for general sport or contest flying, ask your dealer to show you this Miss America model, or order direct from Scientific. Complete Kit, $9.50 postpaid, less motor. Miss America Kit and Brown Jr. "D" Motor only $19.50, postpaid.

THE STREAMLINER

Wingspan 6 ft.; Weight (Less motor) 2¼ lbs.; Length 43"

Gas model builders from coast to coast are acclaiming this new gas model. The Streamliner is really an advanced type of gas model, and the kit is the most complete on the market. Complete construction kit, Postpaid, or at your dealer, $4.95 Less motor and wheels. Complete kit as described above, but including a pair of 3½" pneumatic rubber air wheels (value $1.50 pair) Less motor, POSTPAID. **$5.95**

ALL THE THRILLS OF GAS MODEL FLIGHT!

NO EXPENSIVE GAS ENGINES NEEDED WITH THESE MODELS—A DUMMY ENGINE IS SUPPLIED WITH EACH KIT

The FLEA

Wingspan 36" Length 28" Weight 4 oz.

This gas-type rubber-powered model will give you all the thrills of building and flying a real gas model at a fraction of the cost.

KIT CONTAINS EVERYTHING required to build the model 100% complete: Pair of 1⅝" M & M pneumatic wheels with inflating tube; tru-pitch 10" balsa propeller; ribs, bulkheads, etc., printed on balsa; cement; clear dope; rubber lubricant, etc.; brown contest rubber; all necessary metal for building ratchet motor-hum effect; easily understood plans including all information on building and flying the "Flea" model.

Looks like a gas model—flies like a gas model—sounds like a gas model—yet costs only.....

$1.95 Postpaid or at your dealer, including M & M Pneumatic rubber wheels

VALKYRIE

GAS TYPE RUBBER POWERED MODEL

Wingspan 24" Length 15" Weight 1¼ oz. Flies ½ mile

The "Valkyrie" incorporates all the attractive and outstanding features of its gas model original; can be easily constructed in 4 or 5 hours. Sturdily built with continuous one-piece wing root built into fuselage and securely attached to underside of wing. Dummy motor looks like the real thing and is easily built. Beautifully colored and a real super-streamlined flyer. Complete kit, with full size plans and instructions, postpaid..... **$1.00**

SCIENTIFIC MODEL AIRPLANE CO.

...Street "GAS MODEL HEADQUARTERS" NEWARK, N. J.

...r & Co., St. Sebastien, Paris. ...Model Supplies, 195 Adelaide St., Brisbane, Queensland.

In England: H. & S. Norman, 46 Derby Rd., Kirkhams, Prestwich, Lancs. In South Africa: Stratosphere Model Aircraft Supplies, P. O. Box 3248, Johannesburg.

The Hybrid Airplane Contest No. 1

Do You Know Your Airplanes? Enter This Simple But Interesting Contest and Win an Award While You Learn Distinguishing Features of Some of the Modern Airplanes

By NICK LIMBER

AS MODEL airplane fans throughout the country are always clamoring for something new, something different, we feel that in presenting the Hybrid Airplane Contest we have satisfied their demands.

What is the Hybrid Airplane Contest, you ask? Well sir, allow us to explain.

Undoubtedly you have often seen photographs of foreign ships that are externally designed like many of the popular American airplanes. You have often remarked or even boasted of your ability to "spot" or identify various planes by the shape of their tail fuselage, or wings. You have often wondered what type of plane could be made by using parts of different airplanes and combining them into one ship. We wondered too until we actually tried it and behold our results . . . the hybrid airplanes that appear in the diagrams.

Can you tell what planes were used in making the hybrid ships? To those who can identify and correctly name the types of airplanes used in each diagram, MODEL AIRPLANE NEWS will offer handsome prizes and awards.

Now is the time to test your ability and reap your reward. Age, skill and experience are unimportant. Only ability to recognize the various parts of each ship is required.

You are invited to test your ability by naming the airplanes and the parts of each used in creating these hybrid ships.

To illustrate our point, follow us step by step in the process of identifying the first three view hybrid drawings.

The drawing we are concerned with is the one marked No. 1S. Notice that the airplane in this diagram is of a type that we have never seen before, yet there is something about it that suggests a popular service ship.

In analyzing the drawings we soon discover that the fuselage resembles that of a Consolidated. We do a little research work to see if we are correct. While looking through various aeronautical publications and old issues of MODEL AIRPLANE NEWS we come across the February, 1936, issue of M.A.N. and find a drawing of the Consolidated A-11.

After studying the plans of the Consolidated and the hybrid ship we discover that they have the same fuselage. Thus we have identified the fuselage of hybrid ship No. 1S.

Upon further study of both planes we discover that the rudder is also the same. In this manner we have identified both fuselage and rudder.

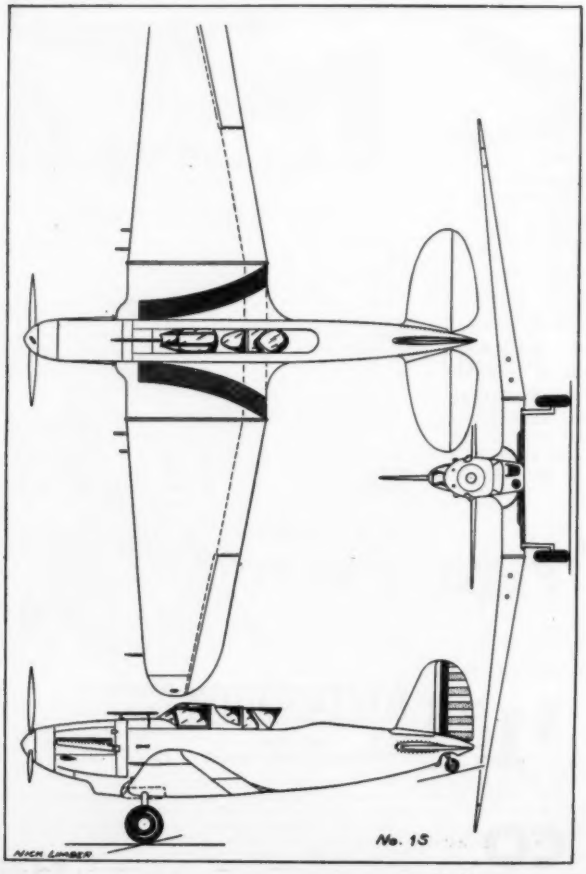
We now go through other issues until we find ourselves looking at the August, 1937, issue of M.A.N. While turning the pages we soon come to a set of drawings of the Northrop A-17-A. Upon examining the wing of the hybrid airplane and that of the Northrop A-17-A we discover they are alike. Looking at the various views of the wing in each diagram we find that it was the Northrop A-17-A wing that was used in the first hybrid airplane.

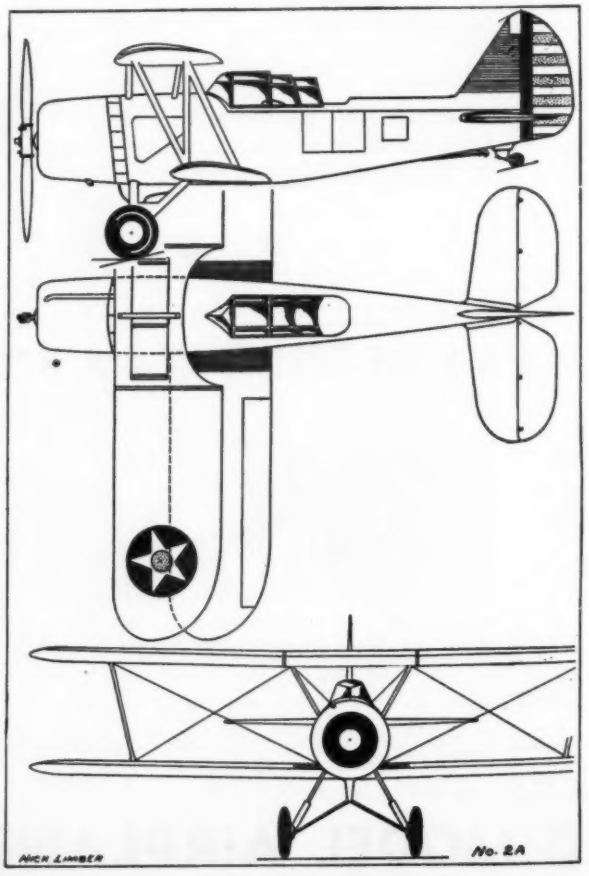
At this point note that if the landing gear of an airplane is designed as part of the wing, it is considered as part of the wing. If it is attached to the fuselage it is considered as part of the fuselage unit.

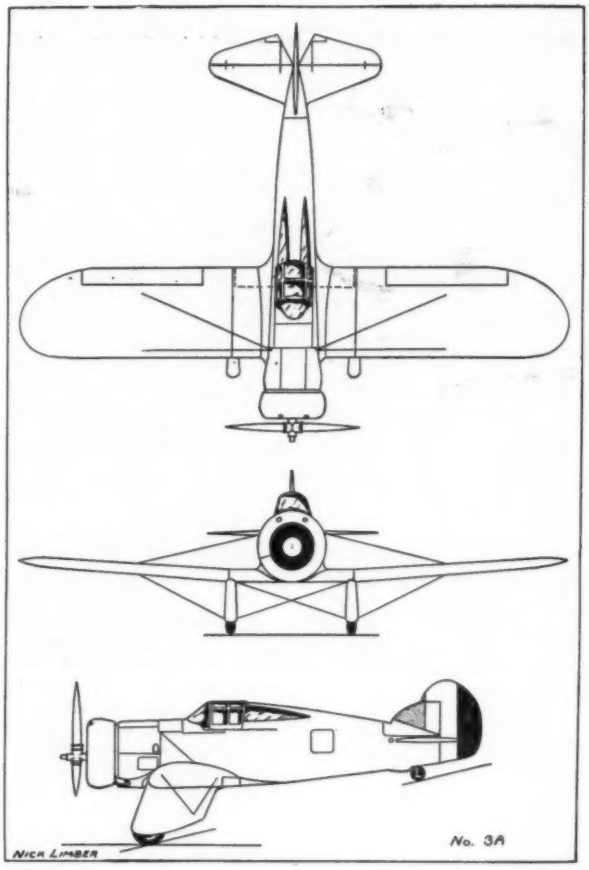
With the wing, rudder and fuselage identified, we must name the airplane from which the elevators have been "borrowed."

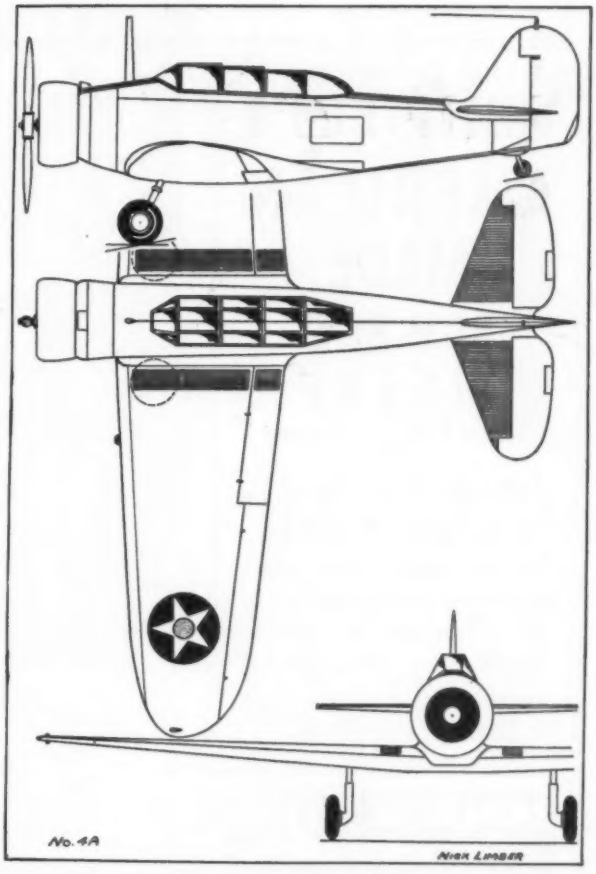
When studying the shape of the elevators we soon realize that they resemble those of a Lockheed airplane. We look

(Continued on page 38)









Answer Blank for Diagram No. 1S

Insert name of plane to which the following parts belong.

Fuselege.....Consolidated A-11.....

Wing.....Northrop A-17-A.....

Rudder.....Consolidated A-11.....

Elevators.....Lockheed Vega.....

Name.....Jack Doe.....Age....18 years...

Address.....909 Marks Street.....

City and State.....New York City, N. Y.....

Answer Blank for Diagram No. 3A

Insert name of plane to which the following parts belong.

Fuselage.....

Wing.....

Rudder.....

Elevators.....

Name.....Age.....

Address.....

City and State.....

Answer Blank for Diagram No. 2A

Insert name of plane to which the following parts belong.

Fuselage.....

Wing.....

Rudder.....

Elevators.....

Name.....Age.....

Address.....

City and State.....

Answer Blank for Diagram No. 4A

Insert name of plane to which the following parts belong.

Fuselage.....

Wing.....

Rudder.....

Elevators.....

Name.....Age.....

Address.....

City and State.....

Ask Your Dealer For

WHITFIELD'S AMERICAN MADE BAM-BOO TISSUE

Colors: Natural, Red and Yellow

Reference from Louisiana

The sample of Bamboo Tissue you sent was turned over to the local Jr. Chapter N. A. A. for testing. They find it very good and are high in their praise of it.

JAPANESE TISSUE

Brilliant

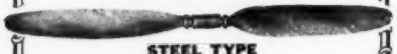
THIN AND STRONG

AA In 32 Colors AA

JAP PROPS

STANDARD TYPE

BROAD BLADE
50% More Efficient



STEEL TYPE

MINIATURE CELLULOID MOTORS

4 sizes: 1½"; 2"; 2½"; 3"

Another Japanese Import

These lightweight motors have been designed to our specifications. Every detail of the original radial engine has been accurately reproduced even to the cowl plate at the front. They are a distinct improvement over any other dummy motor. At Whitfield's low price, they can be easily included in every flying model kit.

We Pay Shipping Charges

WHITFIELD PAPER WORKS

Note New Address:

76 VARICK ST. NEW YORK CITY

Established 1869

How To Improve Your Glider Flights

(Continued from page 7)

the amount of dihedral used can be less than on a glider of less weight, because the fuselage acts as part of the stablizing force, and less lift is lost due to excessive dihedral. Of course, if the same amount of dihedral is used as on a lighter glider of the same type, the weight rule ship will be more stable and therefore a better flier in spite of the added weight. On a glider of this type there should be little or no angle of incidence on the wing and the stabilizer should be set at about one degree positive incidence. This causes the radius of loop (size of verticle circle described by glider when thrown) to be enlarged. Thus the ship will attain more altitude on launching. Also, little or no balancing weight will be necessary, so these are both very decided advantages.

We now come to one of the major factors facilitating fine glider flights: the art of obtaining fine, smooth, glossy finishes on all the glider surfaces. This consists of filling in the pores of the wood so that the "skin friction," caused by the airstream passing over the surfaces, is at a minimum. Since "skin friction" is noticeable even at very low speeds, at fair speeds of which the glider is capable, it is a very important factor. The glider is known to travel from 40 to 60 miles per hour when launched, and 12 to 20 miles per hour when in level flight. Air flowing over very smooth surfaces causes less eddies and disturbance than when flowing over rough surface. This determines the speed of a model since the smoother and more streamlined the glider, the faster it will be able to pass through the air. In turn, the height attained on the throw is determined by the model's highest speed, since the faster the ship itself, the higher it will climb before leveling off and going into its flat glide. The flying ability of the model itself therefore depends greatly upon its finish as can be seen, so that subject will be discussed.

There are many good solutions on the market to be used in obtaining a smooth, glossy surface. There are two types of solutions: glider polish and wood filler. The wood filler is first to be used on the wings, tail and fuselage, which were previously finished off with 10 nought sandpaper. It has been found that a "Jasco" solution of wood filler and polish is one of the outstanding on the market, giving exceptional results. This is a creamy-like solution and is rubbed on with a brush and allowed to dry for ten minutes or so. After this it is sanded with slightly rough sandpaper. Then the latter, the finest sandpaper obtainable, is used to give a smooth, velvety finish. This procedure is repeated twice more before the final coat of glider polish is applied. This is administered to the wood and 10 nought is again used to finish it off To make the whole ship glossy, rub down with a piece of flannel cloth and you will have a lustrous, velvety finished surface impossible to duplicate in any other way.

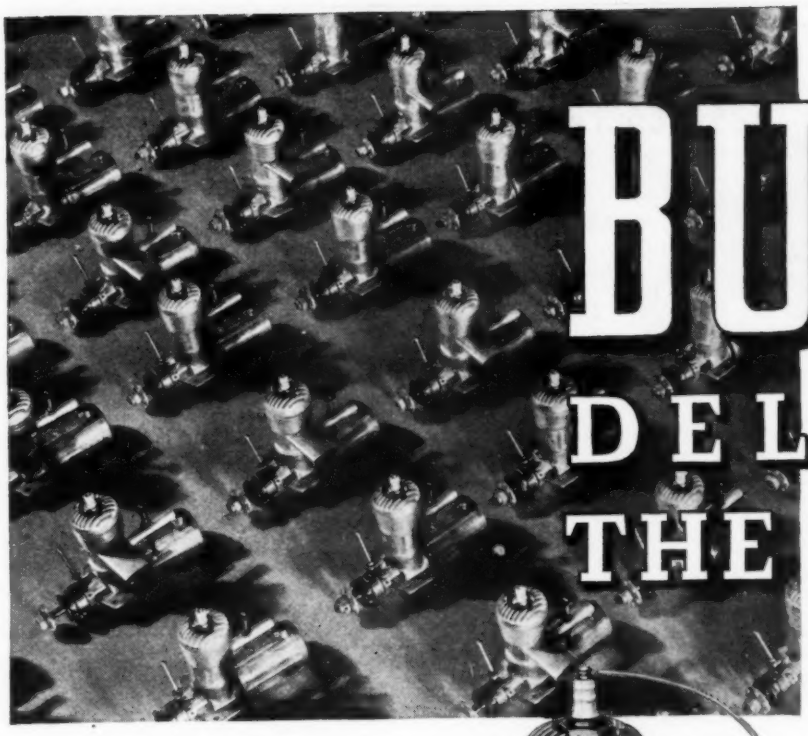
When the glider has been fully assembled after finishing, the flying adjustments must be made. These consist of slight wash-in on the right wing (from rear), and slight left rudder. This should cause a wide left turn when the model is glided from about the height of the shoulders. (Just opposite adjustments for a left hander.) The turn should be wide because when the ship "hooks" into an up-current the turn will become tighter, encouraging a spiral dive, and this must be prevented. When launching the model, it should be held directly under the wing and thrown upward at an angle approximately seventy-five degrees to the ground, and banked slightly to the right. On the first few flights, until the model is well adjusted, it is advisable to hold back a little from full strength throwing. Later, when the "bugs" have been ironed out of the ship, (make sure this is done before a contest), give her all you've got and be ready for some cross-country work. The builder should experiment and find out how his ship performs under all conditions so that on contest day he will know just exactly what to do to make his model perform best.

Although every glider has different flying characteristics, it is a decided advantage for the builder to know exactly how to launch his ship in relation to wind direction, banking angle, etc., in order to get the best flights. Gliders in general act nearly the same when they are adjusted alike. Consequently, it has been found that with the usual adjustments of slight wash-in on the right wing and left rudder, the best way to launch the model is partly cross-wind with the wind striking the model on the right side. (Fig. 4). This allows the model, when launched with the right wing low, to bank to the right; the wash-in on the right wing pulling this side up before a half circle has been completed and bringing the ship into the wind at its maximum height. The model then slows down, going into its flattest possible glide, and gives itself the most possible time to drift into and be lifted by an up-current.

This information applies as much for indoor gliders as for the outdoor type, except that there is no weight rule for the indoor ships. Therefore the materials selected should be as light as possible, yet have sufficient strength to withstand the terrific force of the launching. Care must be taken to make the fuselage very strong so that it can withstand the shock of landing heavily on wood floors before proper adjustment is made, and when it later encounters rafters, lights, etc. On these indoor ships the finish is of utmost importance and care must be taken to get a smooth one in order to stretch and flatten the glide as much as possible.

If these suggestions are used for what they are worth, the beginner or inexperienced builder in the glider line will find, after he has built a few models of this type, that he will wish to put his own ideas on paper for the glider design. He can do so and will have a model which performs *well*. If these basic rules are adhered to a ship of any size or shape will live up to the expectations of the builder and help him "bring home the bacon" from many contests.

Accompanying this article is a glider design which illustrates all the basic rules and theories given, and has been the veteran of many fine flights. Its best time, eighteen minutes, was made on a fine, calm day when it "hooked" into a riser and soared upwards to be later recovered three miles



BUNCH DELIVERS THE GOODS

As much alike as uniformed soldiers, Gwin-Aero, Mighty-Midget and Mighty Marine motors are set up by the hundreds at the Bunch factory.

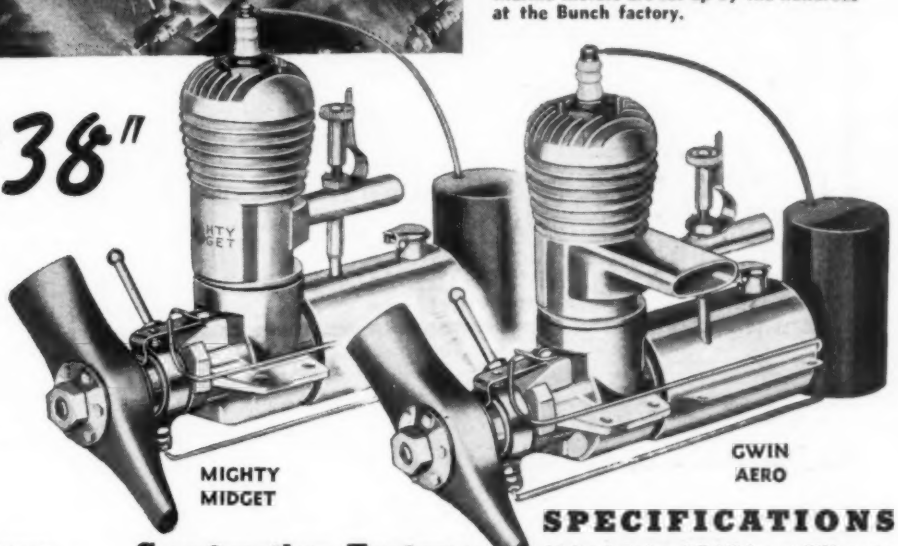
Model "38"

Gwin-Aero
Mighty-Midget
Mighty Marine

Every day scores of Model "38" Bunch engines are lined up and made ready for delivery. Each and every engine is given the master touch of an expert mechanic and is adjusted and tuned for peak performance.

Unquestionably the most durable of all model motors, the "38" models satisfy each owner with an enviable record for easy starting, greater speed and lasting power. From the outset Bunch engineers have investigated and applied the latest engineering advancements to the thousands of engines produced and sold.

Today, well established and proven, the "38" models "deliver the goods." Sold factory assembled or as motor kits, they surpass the highest performance requirements of engines at any price.



Construction Features

Using a modern aircraft finned cylinder and head, the heart of the Model "38" motor is precision finished and electroplated. The intake, by-pass and exhaust parts are fabricated directly to the cylinder and form a lightweight, compact, durable unit.

Fitted with an aluminum alloy high-compression piston and "square section" piston rings, this construction gives maximum performance and actually builds compression throughout the entire life of the engine.

Pressure lubrication at the main bearing through a hollow-drilled crankshaft is not the least of many power-yielding developments. A newly designed, adjustable, self-locking timing system operates efficiently at highest r.p.m. The Micrometal crankcase of aluminum alloy is machine cast to uniform dimensions.

An all-metal cylindrical fuel tank, independently supported, is of regular aircraft design.

SPECIFICATIONS

All Bunch Engines full 1/5 h.p. at 5200 r.p.m.; ¼ h.p. at 8500 r.p.m. Bore 7/8", Stroke 13/16". Bare weight 6½ oz. Engines assembled and block-tested, or kits are complete with coil, condenser, fuel tank and Champion spark plug. Engine kits supplied with piston, piston rings and main bearing fitted ready to run. Also timer assembly set up and points adjusted.

MIGHTY-MIDGET Upright Asbld.	$9.50
MIGHTY-MIDGET Upright Kit	7.85
MIGHTY-MIDGET Inverted Asbld.	9.75
MIGHTY-MIDGET Inverted Kit	7.85
GWIN-AERO Upright Asbld.	12.00
GWIN-AERO Upright Kit	9.85
GWIN-AERO Inverted Asbld.	12.50
GWIN-AERO Inverted Kit	9.85
MIGHTY MARINE Asbld.	12.50
MIGHTY MARINE Kit	10.85

All prices are post paid.

Order Today! Send Postal Money Order

BUNCH MODEL AIRPLANE COMPANY

5013 SOUTH HOOVER STREET, LOS ANGELES, CALIFORNIA, U. S. A.

British Agents: Model Supply Stores, Sales Depot and Showroom, 4 Stewart St., Deansgate, Manchester, 3

Imperial Mystery 66" Gas Model Kit

Amazing in Performance
Simple to Build

$5.50 Postpaid Less Motor Less Wheels

Wingspan, 66"
Weight, 3⅞ lbs.
Color, yellow and red

BROWN, Jr., Model "D" Now $10.00

Here is the gas model you have been waiting for. A fast climber and beautiful glider. Kit contains full size plans and complete step by step instructions, specially selected balsa wood cut to size, liberal supply of liquids, protected motor, spring steel wire, etc. Complete kit. Easy to build. Postpaid.....$5.50

DeLuxe kit including 3½" pneumatic wheels, timer, and 14" carved hard wood prop., postpaid.....$8.50

18" BALSA
1/16x1/16, 100, 5c
1/16x⅛ 35 for 5c
1/16x3/16, 18, 5c
1/16x¼ 15 for 5c
1/16x⅜ 5 for 5c
3/32x3/32 30, 5c
⅛x⅛ 30 for 5c
⅛x3/16 12 for 5c
⅛x¼ 10 for 5c
3/16x3/16 8, 5c
¼x¼ 6 for 5c
¼x⅜ 3 for 5c
½x½ 2 for 5c
1/64x2 4 for 10c
1/32x2 8 for 10c
1/16x2 8 for 10c
3/32x2 7 for 10c
⅛x2 6 for 10c
3/16x2 3 for 9c
¼x2 3 for 10c
⅜x⅜ 1 for 2c
3" sheets or 36" lengths, double above prices; add 10c pkge. charge for 36" lengths.

18" PLANKS
1x1 5c; ⅛x2 6c
1x1½ 9c; 1x2 10c
1x3 15c; 2x2 18c
2x3 23c; 2x6 39c
3x3 40c; 3x6 75c

SHEET 12"x2"
1/16 or 1/32 10 for 10c
⅛ 8 for 10c
¼ 3 for 7c
3/32 8 for 10c
3/16 3 for 7c

BAMBOO
1/16 sq.x12, 3d, 5c
1/16x¾x15, dz. 10c

Now You Can Buy Your Gas Model Supplies at CUT PRICES

5-FOOT BALSA
⅛x⅛ ...30 for 20c
⅛x3/16 12 for 20c
⅛x¼ ...10 for 20c
3/16x3/16...8-20c
¼x¼.....6 for 20c
¼x½.....3 for 20c
⅜x⅜.....1 for 8c
½x½.....2 for 20c
For 5' Lengths add 25c package charge. Specify whether you wish balsa for rubber-powered or gas models. Double Balsa Prices for Spruce, Basswood, or Pine.

SPRING STEEL WIRE
1/16 dia. 5 ft. .12
3/32 dia. 5 ft. .15
⅜ dia.....5 ft. .25

DURAL ANGLES
⅛x½ ..per ft. .15
¼x¼ ..per ft. .22

BRASS ANGLES
¼x¼.....ft. .25

DURAL TUBING
¼ dia. .....ft. .14
5/16 dia.....ft. .20

GAS MODEL
Silk.....sq. yd. .45

. GAS MODEL
Coils 1.50
Funnel ..... .30

FLIGHT TIMER
50 Sec..... .50

PNEUMATIC AIR WHEELS
3½" .....pair 1.50

STREAMLINED ALUM. TUBING
¼x1⅛ ft. 15c
5/16x5/32 ft. 16c
⅜x3/16 ft. 18c

HARDWOOD PROPS FOR GAS MODELS
12" or 14" ea. .90
15" or 16" ea. 1.15

FREE POSTAGE on all orders in U. S.—Add 10c packing charge on all orders (large or small) in U.S.; Canada, U.S. Possessions, and foreign, over $1.00 add 15%. Foreign, under $1.00, add 15c. No C.O.D. No stamps.

NOSE BLOCKS
1x2x1 ..... 1c
2x2x1 ..... 2c
2x2½x1 ..... 3c
3x3x1 ..... 5c
3x3x2 ..... 8c
3x3x3 .....10c

TISSUE, AA
All col. ..doz. 19c
Silver ....ea. 5c
Superfine, wh. 5c

WHEELS per pr.

Birch	Balsa	Celu
½	.01	.03
⅝	.02	.04 .05
1	.03	.05 .07
1½	.04	.08 .10
1⅞	.07	.10 .16
2	.15	.15 .30

SHEET ALUM.
.0004x5x11½ 2-3c
.005 in. 6x6 5c
.010 in. 6x6 6c
.015 in. 6x6 8c

CHAMPION
Spark Plug..... .65
Spark Coil..... 1.50

ALUM. TUBING
1/16, 3/32, ⅛ ft. 7c
3/16 or ¼ ft. 10c

PROP BLOCKS
½ x ⅝ x 5 6—5c
½ x ¾ x 6 6—5c
⅝ x 1 x 7 4—5c
⅝ x 1 x 8 3—5c
¾x1½x10 3c ea.
¾x1½x12 3c ea.
1x1½x12 4c ea.
1x1½x15 7c ea.

BUSHINGS
1/16 .....4 for 1c

CLEAR DOPE or THINNER
5c per oz.; large bottle, 8c; ½ pt. 30c; 1 pt. 45c

COLORED DOPE
6c per oz.; large bottle, 10c

CLEARCEMENT
5c per oz.; large bottle, 8c; ½ pt. 35c; 1 pt. 55c.

PROPELLERS

Balsa	Paul-O-Mach. Cut	Wins
5"	6c	10c
6"	8c	15c
7"	6c	20c
8"	7c	25c
9"	8c	30c
10"	8c	35c
12"	10c	45c
14"	14c	
15"	15c	60c

RUBBER
.045 .....25 ft. 5c
1/16 sq., 15 ft. 5c
¾ flat ..15 ft. 5c
Skein 50c
3/16.....10 ft. 5c

RUBBER LUBRICANT
Large bottle .10c

SANDPAPER
Doz. sheets.....5c

INSIGNIA
24 and stripes..5c

WASHERS
1 doz. ¼ or ⅜ 1c
1 doz. ⅝.....10c

THRUST BEARINGS, doz.
Sm. 10c; Lge. 15c

Your choice of one of these **FREE OFFERS** with all orders for $1.00 or over

FREE
A. Large bottle clear cement and 60 1/16 x1/16x18 balsa
B. 2 pr. 1⅞" Birch Wheels
C. 3 sheets silver tissue
D. Membership Pin in IMPERIAL MODEL CLUBS which entitles you to 5% discount on orders of $2.50 or more

20 IN. FLYING PLANS 10c—3 for 25c
Sparrow Hawk, Boeing Trans. 247, Spad Chass., Vought Corsair, Curtiss Swift L., W.; Waco Cabin Biplane, Douglas Dolphin, Boeing P12F, Fokker D-VII, S.E.5, Goshawk, Gee Bee, Boeing P26A, Monocoupe, Northrop Gamma, Fairchild 24 Cabin, Corben Super-Ace.

SELECT ANY 1 OF THE ABOVE PLANS in 20" FLYING KIT Postpaid 35c

36" FLYING PLANS
Fokker D-VII, Corben Super-Ace, Curtiss Goshawk, each 25c

Send 10c for 16-page Catalog—Dealers: Send for Wholesale List.

IMPERIAL MODEL AERO SUPPLY
416M McDonald Avenue Brooklyn, N. Y.

The Physics of the Airplane

(Continued from page 11)

ward velocity was zero to begin with, and had to be built up by the tractive force of the propellers to a speed which developed enough lift on the wings to permit it to rise from the ground. This means that the machine had to undergo an elapse of time before its rated air speed was attained. It also had to land, and the process of deceleration from its rated air speed to a standing stop had to be undertaken. By this it can be seen that although a machine may easily cruise at 200 m.p.h., it cannot necessarily cover 200 miles airline in an hour even in theoretically still air in level flight. In actual practice, time must be taken out and added to the total elapsed time by climbing and landing functions as well as headwinds and rough air.

When the velocity changes at a uniform rate, the air speed at the beginning and the ending of a flight may be found by adding the two air speeds together and dividing the sum by two. This is the average velocity at which the airplane has been moving. Briefly, this means that part of the time during the flight the machine has been flying at an air speed greater than average, and the balance of the time less than the average air speed. The airplane distance covered in this case is the same as if the machine had flown the entire flight with a velocity as great as the average velocity.

For example—in a speed test of a racing airplane. If the machine flies across the starting line at 300 m.p.h. and finishes across the finish line at 320 m.p.h. what is the average velocity along the speed course?

Solving:

$$\text{Average airspeed} = \frac{\text{Initial airspeed} + \text{final airspeed}}{2} = \frac{300 + 320}{2} = 310 \text{ m.p.h. average airspeed}$$

Converting into feet per second:

300 m.p.h. equals a speed of 440 f.p.s.

Proof:

60 minutes in 1 hour
60 seconds in 1 minute
60 x 60 equals 3600 seconds in one hour.
300 x 5,280 (feet in 1 mile) equals 1,584,000 feet.

$$\frac{1{,}584{,}000}{3600} = 440 \text{ f.p.s.}$$

440 x 3600 = 1,584,000 feet or 300 miles.

An airplane is constantly subjected to acceleration in flight operations. For instance, in flight the thrust force of the propeller equals the drag. Up to this point and during the take off, the thrust force is greater than the drag, with the result that the airplane is accelerated up to the point of its designated flying speed. Acceleration is the rate at which the velocity of the airplane changes. This quantity is determined by dividing the variation in airspeed by the time in which the change takes place elapses. Acceleration then, from this, may be defined as: "the change in the airspeed per unit of time." The acceleration is a vector quantity, and it can be uniform in its rate or variable. For example:

Acceleration of an airplane taking off is $= \frac{\text{Change in airspeed}}{\text{Time}}$

away. Its consistency, however, is its best characteristic and flights of over four minutes are quite common in suitable conditions. Build this steady flying ship and get your share of the thrills it affords a-plenty!

Hybrid Airplane Contest

(Continued from page 34)

at diagrams of different Lockheed ships and soon discover that they belong to the Lockheed Vega. The November, 1936, issue of M.A.N. proves that we are correct. With the elevators identified, our task is completed.

What could be more simple, more entertaining than working on these hybrid diagram solutions.

When each part of the hybrid ship has been identified we fill out the answer blank and proceed with the next diagram.

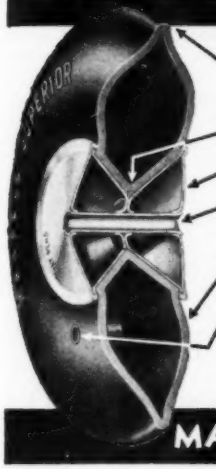
On page 13 is a sample answer blank prepared for the diagram we have just solved.

Rules and Regulations

1. Each month for three months a number of three view drawings of hybrid airplanes will be presented. The contest starts with a set of three plans in this issue. Contestants must submit answers to all three sets of diagrams in order to be eligible for an award.
2. Answers for the first set of plans appearing in this issue must be at the office of MODEL AIRPLANE NEWS, 551 Fifth Avenue, New York City, not later than midnight May 2nd.
3. Each answer blank must bear your full name, address and age printed clearly in the space indicated. The contest will be judged on accuracy and neatness of presentation.
4. The judges will be Mr. Charles H. Grant, Mr. George Johnson and Nick Limber. The decision of the judges will be final. Duplicate awards will be made in case of ties.
5. All answers submitted become the property of MODEL AIRPLANE NEWS and will not be returned. The blanks on page 13 may be used to submit your answers or blanks similarly arranged.
6. The awards are as follows:

1st place—$10.00.
2nd place—$6.00.
3rd place—$4.00.
4th place—$3.00.
5th place—$2.00.
6th place—$1.00.
7th place—$1.00.
8th place—$1.00.
9th place—$1.00.
10th place—$1.00.

MARPELL WORLD'S FINEST STREAMLINED GAS MODEL WHEEL



No other wheel has all these patented features:

- **Raised "Wear-Ever" Tread.** Narrow ground contact prevents "ground-looping" . . . assures streamlined shape at full air pressure.
- **Full Diameter Pneumatic Cushion.** Fifty per cent more resiliency with shock absorption right to the very axle.
- **New Patented Duralumin Hub.** Fabricated all-metal hub, of conical shape, saves weight and can not rim cut. Polished to a bright chromium finish.
- **Long-Life Bronze Bearing.** Reduces friction . . . prevents wear and binding for entire life of wheel.
- **Finest Grade Ebony-Finished Rubber.** Smoothly vulcanized to an even .072" wall thickness . . . black satin finish not affected by heat or cold.
- **"Air-Check" Inflation Valve.** Holds full pressure indefinitely . . . valve is flush with tire . . . inflates with ordinary tire pump.

This new, no-leak, patented "Air-check" inflation valve is guaranteed against defect. Entirely original in design, this valve will not leak by outside manipulation or on landings. To regulate pressure, a simple adapter that fits any tire pump is furnished with each pair

Your choice, 4½" diam., wt. 4 oz. pr.; or 3½" diam., wt. 3 oz. pr., either size.

Per pair . . .

$2.00

Post paid in U.S. California Buyers add 6c State Sales Tax.

ORDER DIRECT FROM FACTORY

We have eliminated dealers' discounts and made possible this attractive price. Send postal money order. Please do not send checks.

MARPELL SUPERIOR PRODUCTS CO. 6406 Victoria Ave., Los Angeles, Calif.

If the take off speed of some airplane is 50 m.p.h. and 2 minutes later it has attained an air speed of 70 m.p.h., what is the acceleration experienced by the plane?

Proof: $\frac{70 - 50}{2} = \frac{369{,}600 - 264{,}000}{120} =$

$\frac{105{,}600}{120} = 880$ or 440 f.p.m.

$\frac{440}{60} = 7.333$ feet per sec.

Note: 120 seconds equal 2 minutes. In working in these formulae convert all units to the same denomination.

The average acceleration is equal to the total change in velocity divided by the elapsed time.

Acceleration is divided into two kinds. When an airplane is gliding to a landing, it is decelerating or losing its air speed. When it is taking off, it is gaining velocity or air speed. In one instance the acceleration is negative and in the other instance it is positive. In taking off, the airplane is subject to a constant acceleration until it attains its normal level flying speed where the thrust effort is equal to the drag. This is an example of uniform acceleration. An airplane in a power dive will increase its translational speed in a vertical direction until the drag is equal to the pull of gravity. At this point the drag is equal to the gravitational force and the terminal velocity is said to have been reached. Up to this point acceleration is equal to 32 feet per second in falling.

An airplane is a vehicle which starts from rest with an initial acceleration. At the end of a specific interval of time it has attained an initial velocity and if this acceleration is constant until flying speed is attained, the initial velocity will be equal to the time in seconds until flying speed is reached, multipled by the initial acceleration. The equation that represents this is:

Velocity at end of take off = Rate of change in velocity x time. (Final velocity)

Average velocity over this time = $\frac{\text{initial velocity} + \text{final velocity}}{2}$

The ground run or the distance passed over = 1/2 x rate of change of velocity x time x time.

In these days of air raids and undeclared wars, the subject of aerial bombing is constantly coming to the fore. This involves the subject of falling missiles from aircraft. When a bomb is released from the bomb chute aboard the airplane, it will move forward with the same horizontal velocity it had at the beginning, except for whatever decrease can be attributed to the resistance to its motion by the air.

The projectile will fall because of the attraction resulting from the gravitation of the earth. The bomb is subject to two velocities. One velocity is forward which is constant. The downward velocity is the other, and it increases with the time the projectile is falling. The net effect of the gravitational force is similar to the force of gravitational attraction for a projectile which fell from a high altitude without any forward motion at all, which in this case is imparted by the moving bombardment airplane. The path that such an object travels is in a "parabola." This curvature of the path of the projectile makes the use of accurate and complicated range and bomb-sights of imperative necessity if some particular objective target must be destroyed. From this it can be ascertained that aerial bombing is a problem of physics, pure and simple. See Fig. 1.

The velocity of the projectile in a downward direction is equal, at the end of any specific time, to:

Velocity = vertical component x time

The distance the projectile falls in the time is equal to: Distance projectile falls = ½ x vertical component x (time²)

The vertical component equals the distance fallen in unit time.

The horizontal component equals the distance the projectile moves forward in unit time. These two forces or components are not equal. The pull on the object because of gravitational force is greater after several seconds than the forward or horizontal component. The projectile takes the resultant of the two forces. The higher the projectile falls, the greater becomes

FINISHED MODELS

These models are completely finished and attractively mounted on a polished metal pedestal.

They are built of pattern pine and are lacquered to a satin smooth finish. Wingspans average 7 inches. They are built true to scale and embody many details. The following models are available:

Curtiss "XP-37"	Hawker "Hurricane"
Grumman "XF4F-2"	Curtiss "Hawk 75"
Seversky "P-35"	Taylor "Cub"
Curtiss "SBC-3"	Curtiss "P-36-A"
"Rudy Kling's" Folkert	"Roscoe Turner's" Meteor
Bell "Airacuda"	DeHavilland "Comet"

These all have 7 inch wingspans and are **$2.25** each, postpaid. No C.O.D. orders or stamps please. Also print name and address when ordering.

28 Peach St. MUELLER BROS. Buffalo, N. Y.

SEE PAGE 1

LOOK! LOOK! LOOK!

Burrows Special Wins

29 minutes and 23 seconds official time

Wing span, 5½'. Chord 12". Flying weight 3¼ lb.

Burrows Special, built by W. B. Russell, Charlotte, N.C. won the North Carolina State contest, for Model Airplanes, held at Greensboro, N.C., May 21st.

Official time 29 minutes and 23 seconds. Open competition event 30 seconds engine run limit. This ship soared out of official sight, after 29 minutes and 23 seconds, and was reported one and one half hours later, two thousand feet in the air, and twelve miles from the airport.

Burrows Special Kit complete, (less motor, timer or air wheels)..... **$5.50**

Burrows Special Kit complete (less motor), with timer and 4½" air wheels..... **$7.50**

Prices F.O.B. Charlotte, N.C.

CHARLOTTE MODEL AIRCRAFT CO.

Professional Bldg. (Basement) Charlotte, North Carolina

FLY THE *AIR CHIEF*
A RECORD BREAKER

$6.00
Complete without Motor

61" wingspan, length 39"
weight 2¼ lbs. without motor

Equip with any standard miniature engine. Kit includes—Wood cut to size, Pneumatic Air Wheels, Formed Shock Absorbing Landing Gear, Die cut Ribs, all needed Parts. Complete without motor **$6.00.**

U. S. S. HARTFORD

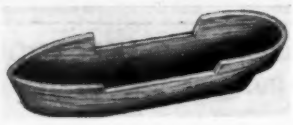
Historic Beautiful Complete
At last the flagship of Admiral Farragut is yours to build. The kit for this 20" model contains: Balsa hull block, 3 sheets printed wood, cement, lacquer, shellac, piano wire, cast metal anchor, cast metal boats, steering wheel, funnel tubing, dowels, sandpaper, rigging thread, beads, and full size plan. **$1.00** Complete

CUTTY SARK

Carved wood hull printed balsa decks, Cast metal: lifeboats, anchor, bitts, steering wheel, chains. Masts, spars, rigging cement, colored lacquer, full size plans, instructions.
COMPLETE..... **$2.50**

Complete Catalog 10c

DEALERS



IDEAL announces a new series of six ship models—each with a moulded hull—to retail at 10c. Write for full particulars describing this new additional way for you to make profits.

Your name imprinted free on IDEAL'S famous TRU-CUT KNIFE—the only all-purpose tool for model building. It is held and operated the same as a pen. It is especially designed for cutting balsa wood, stencils, paper patterns, and other objects requiring accuracy of detail. At last this greatly-in-demand item may be purchased with YOUR NAME IMPRINTED. Retail 10c each. Write for full particulars.

IDEAL AEROPLANE & SUPPLY CO., Inc.
20-24 West 19th Street, New York
Pacific Coast Branch
Model Boat and Aircraft Company
1356 5th Ave., San Diego, Calif.
South Africa Distributor
70 Von Brandis,
Johannesburg, S. A.

the magnitude of the vertical component, in contrast to the horizontal component, after a definite period of time has elapsed. Thus bombs falling from a great height will strike the objective at nearly vertical angles between the earth and the path of the projectile. On the other hand, bombs released from low-flying attack airplanes cause the bombs to strike the earth at a more acute angle.

Dive bombing, as extensively employed by the navy's carrier squadrons, enjoys increased accuracy over that of the mass pattern variety. See Fig. 2. With the former system, the trajectory is flattened from the conventional parabolic curve so that it approaches a true perpendicular. The bombing airplane is dived vertically, with power on often to speeds as high as 450 miles per hour. The projectile is thus given an initial velocity in the aimed direction toward the target, while still in the bomb racks of the airplane. When released, it speeds straight and true to its mark with deadly results.

Glossary

TRANSLATIONAL: Motion of a body which at all points has the same velocity and direction.

ROTATION: The act of turning about a stationary axis.

VIBRATION: A periodic motion of the particles of an elastic body or medium in alternately opposite directions from the position of static equilibrium.

YAWING: Displacements at the nose of an airplane to the right or the left about the vertical axis.

RECIPROCATING: Alternate movement in a back and forth direction.

MAGNITUDE: The greatness or size of an object or force.

DECELERATION: To retard or to diminish a moving object in its velocity.

DENOMINATION: A name or system of units.

PROJECTILE: A missile or an explosive agent of a cannon or bomb rack.

COMPONENT: One of the parts into which a vector may be resolved.

RESULTANT: The finding of a single force which shall be equal in effect to two or more forces.

TERMINAL VELOCITY: This is the limiting speed which an airplane may attain in a dive and where the weight equals the drag.

A High Performance Flyabout

(Continued from page 17)

the nose end, lay off eight dots on the base line, ⅝" apart, making a total of five inches. From the five inch point lay off another dot 1¼" beyond. From these nine dots draw lines at least two inches long down from the dots, and at right angles to the base line. It is now easy to plot the negative ordinates just by following the dimensions on the plans. Connect the ordinate dots by a curved line, and connect the last dot with the end of the base line at the tail. Now the fuselage side is all plotted, and it should be cut out with a razor and then traced onto the 1/16" sheet balsa for the sides. Corners are reinforced with 1/16" square strips. They give more gluing surface for the joints and allow for sanding the corners round. A coat of banana oil on the inside surfaces prevents the rubber lubricant from rotting the wood. Use plenty of glue for all joints, especially the rear motor hook. Do not forget the rubber tubing around the rear rubber hook because it is difficult to insert after the fuselage is all assembled. Slits in the sides, top and bottom are cut to accommodate the elevator and rudder. Coat the nose plug inside and out with cement, to prevent wear due to winding and handling.

The landing gear is made of No. 18 music wire (as are all wire fittings). Use glue generously and attach the whole gear to its proper place, which is well forward with the wheels just clear of the propeller. A 1/64" sheet fairing adds strength and looks to the ship. A pair of 1¼" hardwood wheels are held on by washers soldered to the wire struts.

The propeller is cut from a ten-inch machine cut blank, or from a block 5/8" x 1" x 10" hard balsa. It is imperative that the shaft be perfectly straight and true, because a wobbly propeller absorbs a great deal of the available power. A "Jasco" free wheeler and brass B.B. washer are used. Small brass bushings set in thin sheet brass form the bearing surface for the propeller shaft. The same type of bushings are used on the nose plug, which is built up of scraps of 1/8" sheet and a cylindrical block 5/8" x ¾".

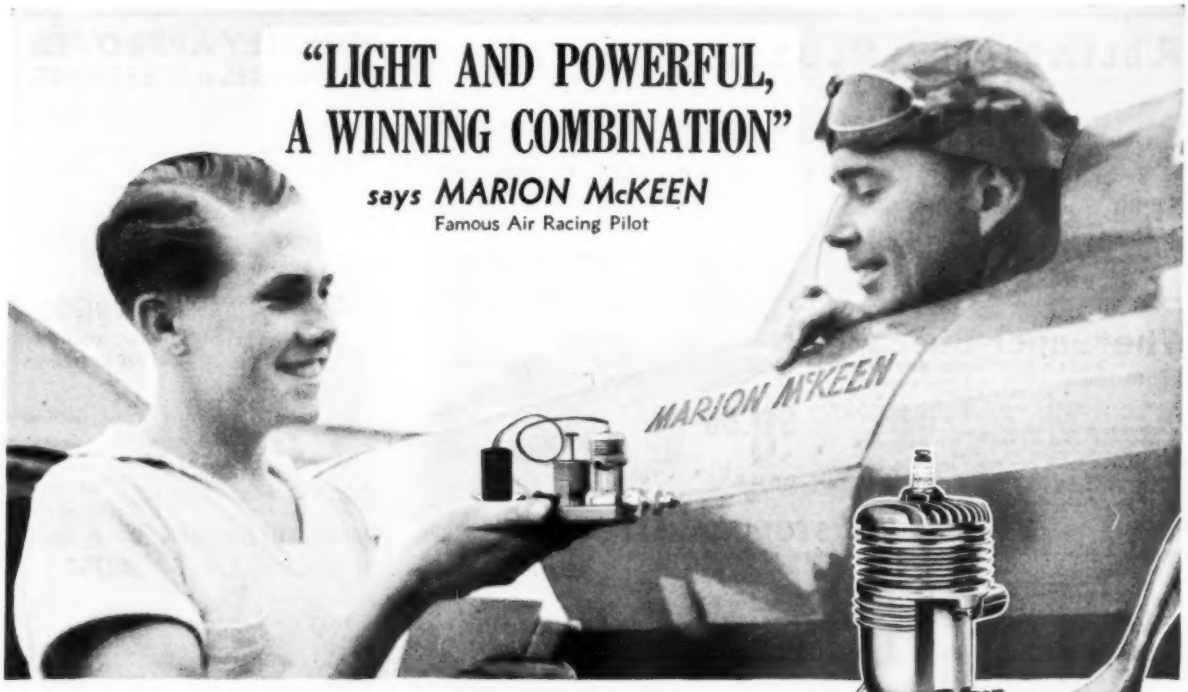
The tail works are very simple, being made of two inch sheets glued edge to edge. The outlines are cut out and the surfaces are sanded down smooth to 1/32" at all edges. To prevent the tips from fraying, they are given a coat of glue, carefully applied to prevent warping.

To some this type of wing construction may seem too heavy, but there is logic behind its choice. (1) It does not raise the C.G. any higher than the average ship, but because heavy wheels and fuselage of sturdy construction counter-balance it. (2) A wing of very strong construction is ideal for experimenting and all-weather flying. (3) Because of its small area, every possible method should be used to obtain maximum efficiency for a high L/D. This type of wing yields a smooth, true airfoil devoid of spar and trailing edge bumps so common to a built-up wing.

It is very easy to construct. Four 1/32" x 2" x 24" sheets are glued together to form upper and lower cambers. They are sanded very thin and smooth. The ribs are cut about 1/32" smaller all around to make up for the thickness of the covering. Although no spar is needed, one may be used to simplify construction. The lower camber is glued to the ribs first and then the upper camber is glued on and blocked down. In order to obtain a thin trailing edge, both sheets are sanded to a very thin taper and glued slightly overlapping, the under camber slightly overlapping the upper camber. The leading edge is glued on and sanded to the proper shape. To prevent wear and fraying, the leading edge and tips are given a coat of glue. This coat, however, should not go further than one-half inch from the edge; otherwise the glue will

"LIGHT AND POWERFUL, A WINNING COMBINATION"

says **MARION McKEEN**
Famous Air Racing Pilot



A *NEW* CHAMPION
The ATWOOD *"Phantom"*

Here is **the** motor you will be proud to own. It has been designed and built by men whose 10 years experience in building thousands of model engines has shown them exactly what YOU **want** and **need** for a winning combination.

Note these exclusive ATWOOD "Phantom" features: **Crankcase**—die cast magnesium alloy (2/3rds the weight of aluminum), built-in by pass, carburetor and exhaust manifold; **Cylinder**—special alloy steel, precision lapped; **Piston**—hardened, ground and lapped to perfect cylinder fit; **Head**—fully finned for efficient cooling; **Crankshaft**—one piece forged steel, hardened and ground, rotary valve integral; **Bearings**—highest grade lead bronze sleeve type in crankcase and rod; **Timer**—accessible, quickly cleaned and adjusted without dismantling; **Carburetor** control at back of engine, positive at all speeds.

$9.75

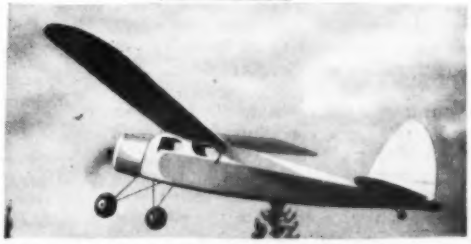
includes engine, coil, condenser, and tank mounted on skids ready to run. Factory run-in, tested and guaranteed.

ATWOOD "Phantom" specifications: Bore 3/4"; Stroke 5/8"; 1/7 h.p. at 6500 rpm.; 3½ oz. bare engine weight; 2 port 2 cycle; height 3 7/16"; length 3".

BUILD THIS 45" MODEL

For a winning combination, use the "Phantom" engine in the Flying Phantom Jr. model plane . . . a proven champion. Total flying weight 22 oz. Complete kit, including full size plans, cement, dope, silk, air wheels, and landing gear formed, all parts cut to shape.....$3.25

For use with larger engines, build the Flying Phantom 62" model. Dry kit, less air wheels, cement and dope.....$4.95



Advance orders are so great that you should place yours **today.** Air Express shipments will be made on the "Phantom" engine in the order of their receipt by the factory.

PHANTOM MOTORS
800 E. GAGE AVENUE
LOS ANGELES, CALIFORNIA

PHANTOM MOTORS, 800 E. Gage Ave., Los Angeles, Calif.

Please rush the following to me:

One ATWOOD "Phantom" engine complete (by air express)	$ 9.75
One Flying Phantom Jr. 45" model plane kit	3.25
One Flying Phantom 62" model plane kit	4.95
One hardwood propeller	.75
Combination: ATWOOD "Phantom" engine, Flying Phantom Jr. kit, and hardwood propeller	12.50

(Add 3% for Sales Tax if delivery point is in California)

Enclosed is my money order for the above.

NAME _____ AGE _____

STREET or RFD _____

CITY _____ STATE _____ ma-1

RELIABILITY PLUS....

Nearly every day letters come to us from satisfied builders of Berkeley-Designed gas models. We take pride in the many prizes won by our ships. However, you want a ship that will be reliable. Roy Keunnen, I.G.M.A.A. record breaker, writes us:

Dear Sir:
In state and city contests I have won seven "Firsts" three "Seconds," and two "Third" places with my "Super-Buccaneer." My plane has turned in 468 flights and has flown 288 times on the same propeller. The plane is one year old.
Very truly yours,
Roy Keunnen.

That's reliability plus!!

$5.00 P.P. U. S. A.

The "BUCCANEER-STANDARD"
Limited Engine Run Champion

3½ ft. wingspan for ⅛ to ⅕ h.p. motors. The Buccaneer was again the first place winner at the Taylorcraft Contest in Ohio. Add to this over twenty other place winners this spring and you have the consistent champion, the ship that can't be beaten. Everything you desire in a small high-powered gas model. Beautiful lines, easy construction, snappy performance, and, best of all, a custom gas model priced with the lowest mass production kits. No kit at even several dollars more can compare with it for completeness. Full size plans. Hardware and ignition equipment. All wooden parts printed out. Large can of cement. Three colors of dope. (Your choice of colors.) Complete kit less wheels and power plant, $5.00 P.P. in U.S.A.

The "Super-Buccaneer"
I.G.M.A.A. RECORD BREAKER
57½ Minutes Official on 2 min. engine run
7½ ft. Wingspan

Since its introduction a year ago, this super-ship has won over 15 "Firsts", and one hundred other prize-winnings in major contests throughout the country. No model engine is too powerful for this sturdy ship. The more power, the higher the performance.
Kit includes: Full size plans; wooden parts printed out; hardware and ignition equipment; pint cans of cement and colored dope; everything to complete the model as pictured except wheels and power plant.

$8.50 P.P. in U.S.A.

THE NEW "CUSTOM CAVALIER"
"The Aristocrat of Model Airplanes"

9 ft. Wingspan
Simplified MONOCOQUE CONSTRUCTION for ¼ to ½ h.p.

On a 30-second motor run this sensational model flew for 1½ hours at Seversky Field, L.I., on April 3rd. Perfect for radio-control. Kit is complete, even to silk for covering, "pearlene" dope, and all wood printed out. Everything to build the model as pictured, except power plant and wheels..... **$15.00 P.P. in U.S.A.**

NOW READY ! !
The Big BERKELEY CATALOG
The only complete catalog of gas models and supplies with three view drawings. Please include 10c to cover handling charges and postage when sending for your copy.

BERKELEY MODEL SUPPLIES
"First in Gas Models"
230 Steuben St. Dept. U-38 Brooklyn, N. Y.

BERKELEY APPROVED GAS MODEL ACCESSORIES

You are assured of complete satisfaction and quick delivery by purchasing direct from the largest stock of model supplies in the country. Every item listed has been service tested and approved by Berkeley.

BROWN JR MOTOR

Model "D"
$10.00 P.P. Complete
READY TO RUN
With Coil & Condenser

Full ⅛ h.p. with power to spare. Backed by the famous Brown Jr. Name and the Berkeley Approval. The only unconditionally factory guaranteed motor in its price class. **60 Day Guarantee.**
MODEL "B" Now rust-proofed for your protection..... **$21.50 P.P.**
MODEL "G" Now rust-proofed and mounted on skids..... **$17.00 P.P.**

IMPROVED OHLSSON GOLD SEAL MOTOR

Newly improved model with extra long crankshaft for longer wear. Easier to cowl. New patented transparent tank and mono-steel piston. Develops over ⅕ h.p. Immediate delivery from stock.

$18.50 P.P.

BERKELEY PROPELLERS

Standard propellers are mahogany stained and varnished. DeLuxe Propellers have metallic finish. Every propeller is perfectly balanced by new machine method.

	Standard	DeLuxe
12" dia. (8", 10", or 12" Pitch).....	$ .60	$1.00
13" dia. (8", 10", or 12" Pitch).....	.70	1.15
14" dia. (8", 10", or 12" Pitch).....	.75	1.25
15" dia. (8", 10", or 12" Pitch).....	.85	1.35
16" dia. (8", 10", or 12" Pitch).....	1.00	1.50

warp the thin sheet covering. The No. 18 music wire mounts are bent and inserted into the wings and glued on. To prevent their becoming loose thin aluminum guards are used. The wing mount is the only thing upon which glue should be used sparingly. The reason is that a heavy coat of glue put on in one small place on a thin sheet tends to curl up at the extremities of the glue skin. This eventually increases and peels off. It may also warp the sheet. It has been found on the original ship that a little glue applied right is very strong. The ailerons are cut out as a final operation and are held in place by one-inch pieces of aluminum wire, glued to the ribs.

The fact that this ship is small does not affect adjustment methods as its larger predecessor. It has a short, fast, powerful climb and flat glide. With half the maximum turns, hand wound, it will turn in a minute and a half flight consistently. Winder wound to 1300 turns. it stands an even chance of being lost every flight. When properly adjusted, it should fly as follows: An extremely steep, almost vertical, climb to 100 feet where it gradually rolls out into a steep spiral climb to the right. There should be no dip when the power gives out. The glide is very flat, with a tight right circle. It is suggested that the adjustments of the original model be used until its flight characteristics are mastered. It must be kept in mind that this ship is very high powered and thought must be given to every adjustment.

Wing:

Adjustments—Set positive two degrees to the rubber base line, right aileron ⅛" down, left aileron ⅛" up.

Elevator:

Set one degree negative to rubber base line. Not to be warped.

Rudders:

Warped approximately 1/16" to the right. This will vary with individual models in order to get the proper turn.

Thrust Line:

11/6" down thrust and 1/32" right thrust..

A 24-inch motor of 14 strands of ⅛" M.R.L. brown rubber is used for power. To those unaccustomed to high power it is suggested that ten strands be used at first and gradually work up to fourteen strands. A good grade of rubber lubricant should be used for best results.

All comments, criticisms, or corrections on this design, would be appreciated.

Bill of Materials

5—1/16" x 2" x 24" quarter grained 8-9 lb. stock—fuselage and tail
4—1/32" x 2" x 24" quarter grained 6 lb. stock—wing
2 ft. No. 18 music wire—all wire fittings
1—10" machine cut propeller blank or a block ⅝" x 1⅛" x 10"
1—pair 1¼" hardwood wheels
4—1/16" diam. brass bushings
1—Jasco B.B. washer
1—Jasco free wheeler
Rubber tubing
28 feet ⅛" brown M.R.L. rubber
⅛" brass washers
1" x 1¼" x 1½" nose plug.
Scraps of brass and ⅛" sheet balsa

Cost—75c to $1.00, depending upon where the material is bought.

The Seversky Super-Clipper

(Continued from page 15)

shock absorber. When the pontoons are extended, the deep stroke of the hydraulic piston is utilized to cushion shocks and to equalize landings on an uneven sea.

As submitted to Pan American, one of the unusual features of this radical airliner is that passengers are housed in the full cantilever forty-foot chord wing, which affords particularly spacious accommodations. Generous staterooms, each with private toilet facilities, are available for 120 passengers. A dining salon, observation deck, promenade and cocktail lounge very comfortably accommodate sixty passengers. A dial telephone connects all the staterooms and recreation rooms. In order to gain the advantages of high-altitude operation, the entire interior of the Super-Clipper is supercharged to maintain an air pressure equivalent to 8,000 feet when the ship is flying at 20,000 feet.

The Seversky Super-Clipper has been designed to carry a payload of 43,000 pounds, with a cruising range of over 5,000 miles, at a minimum cruising speed of 200 miles an hour and a top speed of over 300 miles per hour. It accommodates 120 passengers, along with the regular crew of sixteen, with all the comforts found in a

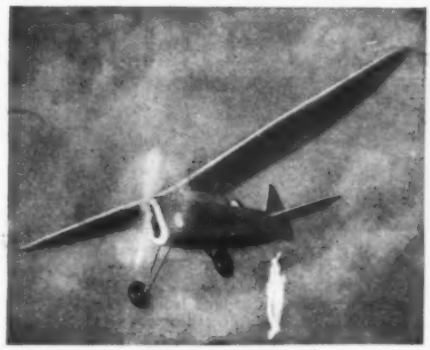
BERKELEY PRESENTS

The "Courier-Sportster"

6-Ft. Wingspan—High Performance Model
For 1/6 to 1/4 h.p. Motors

When Berkeley introduces a new design, it's model-making history. We honestly believe that this new ship is "tops" in gas model design and performance. The ship turned in a 1-3/4 minute flight on a motor run of only 11 seconds, timed by local N.A.A. club officials. The original "Courier" won first place in the beauty contest at the Official Eastern States contest. Could you ask anything more of any model?

You will like the "Courier-Sportster" with its sleek lines and sweep-back gulled wing. You will like its super-stability even better. The motor can be either inverted or upright and can be changed in less than one minute!



$5.95 P. P.
Less Wheels and Power Plant

IMMEDIATE DELIVERY!!

KIT INCLUDES:

The kit has the usual completeness of all Berkeley Gas Model kits. Full size detailed plans with three-dimension sketches of the construction. All wooden parts printed out. Hardware and ignition equipment. Large can of cement and colored dope. (Your choice of color.) Everything to build the model as illustrated. Complete kit less wheels and power plant $5.95 P.P. in U.S.A.

Ask Your Dealer to Show You This New Berkeley-Designed Model

BERKELEY MODEL SUPPLIES
"First In Gas Models."

230 Steuben St. Dept. U-38 Brooklyn, N. Y.

luxury ocean-liner of the Normandie class. To meet the required cruising range that was specified in Trippe's letter, the ship is equipped with gasoline tanks that carry 17,000 gallons—102,000 pounds!—of high octane fuel.

Like the previous models, the Super-Clipper is equipped with the special Seversky "discelerators"—the Major's terminology for split trailing edge flaps. They are inboard of the ailerons and are operated by an electric hydraulic gear. The control mechanism is ball-bearing throughout.

Although the Seversky is proposed basically for trans-oceanic passenger schedules, it was also designed as a possible navy ship if the Pan American contract falls through. As a service ship it would probably be of the PTB type (Patrol-Torpedo-Bomber). It would have a capacity of ten 2,000 pound bombs, and would be able to cruise over 12,000 miles with its destructive missives, at a top speed of 300 miles per hour. Due to the twin float design, bombs and torpedoes could be conveniently located in the center section of the airplane. In addition to the load of ten tons of bombs, there could also be accommodated a sizable torpedo boat which could be used for communication between the plane and shore, or for attack of surface vessels. Until the development of this type aircraft, the navy has felt that the inability of aircraft to enforce an effective blockade by stopping and searching vessels has been limited in its role in our national defense. With this new design, however, this superbomber could accomplish these missions under the protection of the threat of its guns and bombs.

At any rate—whether the ship is eventually built for Pan American Airways as a passenger plane, or for the navy as a superbomber—it would require 2,000 men on three-shift days, for the better part of nine months, to complete this flying juggernaut.

Frontiers of Aviation

(Continued from page 19)

Airways' call for bids five companies answered. They were Sikorsky, Boeing, Consolidated, Douglas and Seversky. Glenn L. Martin's absence from the list was further evidence that he was giving all his time to American Export Airlines, while the reason the others did not bid was because they did not have adequate facilities. At this writing Pan American has not disclosed who will get the contract but by the time this is read it may all be decided. Thus we can only offer a conjecture of what the winning plane will look like. Of course much depends on the designer's opinions on planes of this type besides the general matter-of-fact aerodynamic data of today. Some may have gone beyond Pan Am's specifications to beat out their competitors but staying closely to Pan American's figures a boat of huge proportions would still be the result. Pan-Am wanted something that would have a cruising range of 5,000 miles, cruising at a speed of around 200 m.p.h., with 100 passengers at 20,000 ft. Then there should be sixteen in the crew with a payload of 25,000 pounds! So here goes on what to expect the winning design to possess.

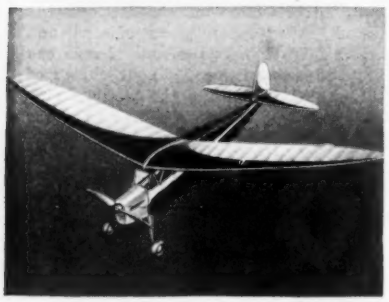
Conjecture: The powerplants should consist of engines around 2000 horsepower. We think Pratt & Whitney will have one available of 2,300 hp. about the time the airplanes are finished. It will not be long before ATC's are pinned on P&W 1830 & 2180 hp. engines. Allison is already said to have something of that size now in the practical stage. Six or eight units will be used, with emphasis mostly on eight, to lower the power loading to maintain that 200 m.p.h. cruising speed. Engines will most likely be air-cooled radials though the in-line engine has good chances. The engines are not apt to take the usual weight trend of pounds per horsepower as their size increases, but will most likely be a little heavier than might be expected in order to feature less fuel consumption in the engines. The fuel consumption is far more important than the slight increased weight of the engine, and this is especially true where a range of 5,000 miles is considered. Better fuels will also play a very important part in putting fuel consumption at a low ebb. On the present day airlines average fuel consumption comes to about .45 pounds per horsepower. This figure even includes spillage and "warm ups." Consumption as low as .40 has been obtained on "many" occasions lately. This is true, especially, on long runs. In the case of the Pan American boats do not be surprised to

3 COMET HITS!

54" AERONCA "K"—$1.00

Amazing stability! A real scale model, 1½" equals 1'0". Shock-absorbing landing gear, removable wings, cabin doors that open and reveal complete interior, movable controls. A "giant" in size and a "giant" in value. Kit No. P-2. Postage 15c, none if ordered from dealer.

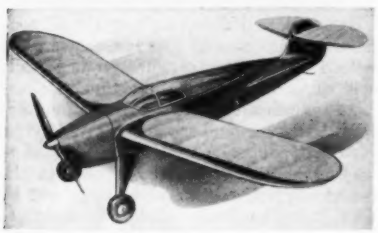
"CLIPPER" GAS MODEL



Designed by CARL GOLDBERG

First and foremost designed to fly. Wingspan 6 ft., length 53½ in. Weight ready to fly, 2 lbs. 5 oz. Wing and tail detachable. Sensational new Comet automatic timer included free. Kit No. T-7—$4.95. With air wheels, $6.50. Postage 25c, none if ordered from dealer.

"GOLDEN EAGLE" GAS MODEL



Especially designed for the small motor. Can be flown as high-wing, mid-wing or low-wing. Wingspan 45 in., length 32½ in., weight ready to fly 1 lb. DeLuxe Model, Kit No. T-8, complete with air wheels and Comet automatic timer, $4.75. Standard Model, features identical with DeLuxe, but a few parts left unfinished—$2.75. Postage 25c, none if ordered from dealer.

Free Leaflet "How to Adjust and Fly Gas Models"

By CARL GOLDBERG, with each kit.

BIG NEW CATALOG!

Just out—a big, new, 28-page Comet catalog, listing over 100 kits, and complete line of supplies and gas model accessories. Richly printed in two colors, profusely illustrated. 5c at your dealer.

COMET MODEL AIRPLANE & SUPPLY CO.

2569 W. Cermak Road, Chicago, Dept. MNS
Eastern Branch: 688 Bway., New York, N.Y.

see fuel consumptions as low as .37-.35! It is well within the realm of possibility and will certainly add much to the efficiency of the flyingboat.

Another important engine feature of these new boats will be sound-proofing, which will lend itself more easily to the liquid-cooled type of engine. With large engines of the 2,000 horsepower type it will be necessary to use long drive shafts with the propellers some distance from the engines. The main reason for this, using plain words, is that the vibrations incurred by a high horsepower engine turning a huge propeller is apt to quickly damage the propeller. Insulating will also play an important role in this instance. Incidentally the long shaft would be very suitable for an airliner with the engine within the wing.

In regard to the propeller we are almost certain to see one of the three-bladed type on these boats because they are the most efficient and their diameter (about 20 feet) will not be too cumbersome. This probably marks the maximum in size for three-bladed propellers though. They will be generally known as "substratosphere" propellers because they will be designed for operation at 20,000 feet which means a good wide blade. Such a propeller would be equivalent to a prop designed today for a 4,000 horsepower engine used at our present low levels! This feature also favors a "substratosphere" prop, which will be more efficient at take-off than our present props. Of course the propellers will have the almost insignificant full-feathering feature and will go to the extreme—the reversible pitch. Though the reversible pitch prop is not as important on a flyingboat as it is on a landplane, it will cut landing run accelleration in half. This would be of major importance in landing on a rough sea with full load. This reversible pitch idea has already been employed for dive bombers here and abroad in cutting down their dive speed and it may be only a matter of months before we see it employed on transport planes to cut down their landing runs. Its chief fault has been the difficulty to get coordination on twin-engined planes. But with the new nose wheel gears there should be more success.

Though the three-bladed propeller is comparatively heavy its efficiency will justify its use for such a long range as that which the proposed Pan American boats will go. However if such engines are to be made available for flyingboats they will also be on hand for other types of planes including even the "small" fighter. You may rest assured that the next 2,000 horsepower fighter that you see will have a six-bladed propeller!—that is if it is a top-notch fighter. Torque considerations and landing gear length make this so.

But getting back to our boats, we will see wingspreads well in the neighborhood of 230 feet with gross loads of 200,000 pounds approximately. Accommodations will be meager but enough to keep 100 passengers amused for at least twenty-five hours. Though there is always talk of going up to as high as 50,000 feet, the 20,000 foot level still stands as the most efficient for these ships. Propeller weights alone would prevent a practical airplane from reaching 50,000 feet at present. At 20,000 feet pressure inside the cabin will remain at an equivalent of 8,000 feet.

Wing loadings will show a marked increase reaching into the category of 40-45 pounds per square foot. Our maximum for a commercial flyingboat has been about 35 pounds per square foot in the Sikorsky S-42-B. We think the wing loading will be nearer 40 than 45 however, for though a wing may be built strong enough to hold the weight and the landing speed slow enough, the airplane should be impractical to operate at 20,000 feet with a loading much over 45. The same now holds true for small airplanes where wing loadings around 25 pounds per square foot prove most efficient.

The reason that we can quote such high loadings on the Pan-Am ships is because the larger the airplane the quicker it can get up to its hump speed, generally speaking, and then an ocean flyingboat has unlimited room to take off and can go for many miles on the straight-away to get flying speed. Flaps are now designed to assist take-off also as well as reducing landings to a safe speed. The bigness of these boats will allow landing speeds over 80 miles per hour, to be accomplished without taking all the passengers on a one way trip to Davy Jones' locker.

The weight of the structure of the wing will increase but other parts, especially the hull, will decrease considerably, comparatively speaking. We must admit, though that on the proposed boats we do not know the per cent of gross weight that will comprise the structure. That is a long-fought argument. We do not expect to see any radical design in the hull though the construction would be more favorable when of steel than aluminum.

Controls are still most likely to be manually operated though larger designs will require hydraulic or electric help. We mentioned this a long time ago. To make manual operation possible the payload will be compact and close to the center of gravity and even at that the big ship will have to go into its landing glide by degrees so as not to jar any of the passengers to the point where they no longer breathe.

We will say here that we do not expect any very radical design departures. Counter-rotating propellers are not likely and perhaps never will be, for they lack the necessary amount of efficiency for long range boats. Two engines geared to one propeller is out for the present anyway though eventually that is Airover's aim. Geodetic construction is something else that can be disregarded. Another is the Diesel engine. When they start putting wings on the "Normandie" they will probably come into effect. . . . And that is our conjecture of the flyingboats which Pan-American will have delivered next. In doing something of this sort one is poking his head out to criticism, as is always true of predicting the future, but watch and see if the boat ordered does not come close to what we have said.

Planes recently having passed the test-hop stage are: Allan Lockheed's Alcor, the new Skylark, and the Aeronca KM powered with a 50 hp. Menasco. Batwing's flying wing job did not survive its tests and met the same unwelcomed fate as did Tuscar Metal's flyingwing a few months previously at Cleveland. The finished Alcor

10,000 A YEAR!

1938 Sales of G.H.Q. Engine Kits are running at the rate of 10,000 a year!!

WHY? Because G.H.Q. gives the *highest* possible value for the *lowest* price. Compare these features with any engine!

NOW G. H. Q. GAS ENGINE KITS AT LOWEST WORLD PRICE $5.00

Here is your opportunity to buy a Kit of the famous G.H.Q. Motor. Absolutely complete—all machining done—ready to assemble. All you need is a screwdriver. Over 7000 in use today.

BUILD YOUR OWN ENGINE AND SAVE

1. Easy starting.
2. Steady running—as long as gas, oil and spark are supplied.
3. Motor cannot overheat.
4. All parts replaceable.
5. Cylinder and piston lapped.
6. Accurate die castings.
7. Crank shaft balanced and perfectly machined.
8. A light spark coil that is oil, water and gas proof.
9. Coil will not overheat or shortcircuit.
10. Main bearing is high-speed bronze, reamed and lapped to size.
11. Condenser is gas, oil and water proof.
12. Cylinder and piston inspected to insure long life.
13. Chrome nickel steel shaft with 1⅛" bearing surface.
14. Connecting rod of high speed bronze.
15. Carburetor assembly accurately designed and made.
16. Needle valve and valve body machined together.
17. Breaker assembly compact, fool-proof, long-wearing, replaceable and adjustable.
18. Easily inverted and runs in either direction.
19. Absolutely safe—impossible to explode.
20. Motor starts and runs on 2-ounce battery.
21. Speed range 300 to 7,000 R.P.M.
22. Low gas consumption—runs 27 minutes on one ounce of gas.
23. Strongest miniature motor.
24. LOWEST PRICE EVER SET.

PLUS THESE NEW FEATURES:

1. The famous WINSTON coil is now standard equipment.
2. CHAMPION Spark Plug included in every kit.
3. New high compression Piston and Cylinder.
4. New light carburetor with spring control.
5. Free Sportster Gas Model plans with every kit.

AN ENGINEERING TRIUMPH . . .

Never Before at So Low a Price!!

Indeed an engineering triumph—accomplished by outstanding G.H.Q. designers and engineers, who have constructed into the G.H.Q. motor everything that years of exhaustive scientific aerodynamic research could produce—geared to the highest possible degree of perfection. But more than that the acid test . . . an overwhelming response. Thousands of users in all parts of the country are praising, recommending, and endorsing this scientific achievement. It seems as if everyone in America wants one. The most hair-raising thrill you've ever experienced will be yours with the G.H.Q. motor—actually one of the most powerful motors ever constructed. Has broken records for amazing performance . . . and just imagine—flies model planes up to 10 foot wingspread. And just as efficient for boats and stationary use. Easy to start and simple as ABC to assemble.

Everything is in the kit including plug, coil, condenser, tank, ignition wire, cylinder, piston, connecting rod, timer, crankshaft, all screws, nuts, bolts, etc. Every part is fully machined and finished. No oil, gas, batteries, or propeller included. A SCREWDRIVER IS THE ONLY TOOL YOU NEED.

$5.00

G. H. Q. Assembled Motor $10.00

Now offered at a new low price. The famous G.H.Q. Engine completely assembled and guaranteed to run.

No oil, gas, batteries or propeller included.

HOW TO ORDER: SEND ONLY $1.00
We ship express collect C. O. D. for balance.
Full descriptive catalog 3 cents.

DEALERS Share in the tremendous demand for G. H. Q. products. Write in on letterhead for terms and sales helps.

G. H. Q. MOTORS, INC., 854M East 149 Street, NEW YORK, N.Y.

SELLEY-TEX FLYING MODELS

Construction Kits

Selley-Tex models are guaranteed to fly . . . guaranteed to give you fun and thrills. Only in Selley-Tex models can you enjoy the combined advantages of a moulded crash-proof fuselage, scientific design, simple sturdy construction, and smooth flying performance.

SELLEY-TEX AERONCA

50c

Postage 15c

A Guaranteed Kit 16" wing span complete.

The New SELLEY REDI-TO-FLY **"BULLET"**

NOTHING TO BUILD!

A Guaranteed Kit C16 Wingspan

75c

Postage 15c

SELLEY-TEX REARWIN SPEEDSTER

30" WINGSPAN

THE "BULLET"

Buy it . . . Fly it . . . in ONE MINUTE! No messy construction, no complicated plans to follow. Just attach the wings and propeller, wind up the powerful motor, and let 'er go! One-piece moulded fuselage—practically crash-proof . . . moulded puncture-proof wings . . . authentic detail from nose to tail. The greatest model airplane value ever offered. Sleek, formidable looking, military pursuit-type plane, super-streamlined throughout. The Selley "BULLET" will thrill you with its flashing speed, remarkable stability, and sensational flying performance. If your dealer can't supply you, order direct, adding 15c for postage.

$2.00

15c Packing & Postage

COMPLETE

DEALERS - JOBBERS!

Write for confidential list & discounts

GAS MOTORS

Ready to Run

OHLSSON 1/5 H.P. ..... $18.50 pp

SYNCRO-ACE $13.50

BROWN Model C ..... $17.50 pp

BROWN Model D $10.00

Brown M Marine rustproof with flywheel $15.00

WHEELS

M&M Pneumatic

3½" ..... $2.75 pair

4½" ..... $2.75 pair

OHLSSON—Streamlined

2¼" ..... $1.25 pair

3½" ..... $1.50 pair

4½" ..... $1.75 pair

COLLAR with set screw for holding wheel on axle 1/8" hole ..... 10c each

Order your supplies direct from a reliable company who can supply you with anything you want in GAS MODEL SUPPLIES.

Flight timer 1 to 60 sec. $3.00

Firecracker Coil $2.50

Brown Spark Plug ..... .60

Champion Spark Plug ..... .60

DURAL ANGLE

1/4"x1/2" ..... 15c per Foot

3/4"x3/4" ..... 20c per Foot

MUSIC WIRE

1/16"x60" 10c a length

3/32"x60" 15c a Length

1/8"x60" ..... 20c a Length

REED 36" LENGTHS

3/16" or 1/4" dia. ..... 5c a Length

ALUMINUM COWLS

OPEN, CLOSED or DRAG

4½" diam. ..... 75c each

5" diam. ..... 90c each

5½" diam. ..... 1.25 each

6" diam. ..... 1.25 each

TURNBUCKLES

3/4" take-up ..... 20c each

COVERING

Silk per square yard 50c

HEAVY BAMBOO PAPER

24"x36" White 5c; Sheet RED or YELLOW 2 for 15c

SELLEY MFG. CO., INC., DEPT. 309 1373 GATES AVE., BROOKLYN, N. Y.

ship turned out to be as sleek as we predicted with its 250 horsepower Menasco engines laid on their sides in the nose. Top speed is 211 m.p.h. which is good for an airplane with a gross load of 6,200 pounds.

There is no doubt you have been reading about Great Britain contemplating the purchase of hundreds of war planes from us. Surprisingly so, it seems more inevitable than one would ordinarily expect. Now that five English representatives have toured through all our factories with the pretext of buying warplanes it seems that England will feel obligated to us and order some ships. . . . But it is our estimation it will not amount to a row of pins.

If you are really looking for big news in the export line there is a movement now going on to purchase large quantities of used transports from our airlines. There should be very many of these when the four-engined ships and also Curtiss' new twin-engined giants become available. DC-3 transports, for instance, could be readily converted into bombing planes.

The Capelis Company has been talking with Timm about the construction of a new transport. In the meantime the old ship has been taking on wrinkles with age, some of them caused by a recent forced landing with the wheels up. The plane aged quite a bit on that occasion.

Mr. Miles of England has an ultra-streamlined four engined project in mind which will cruise at about 267 miles per hour. Its span will be 100 feet. His company is considering building a small test model of the ship powered by Menasco engines, before delving into the larger plane. In France there are many test models of proposed trans-ocean flyingboats under way.

New Engine for Light Planes Makes Record

The ghost of the "Last of the Mohicans" is on the trail again. Another member of the same tribe of Lenape is taking to the sky trail. This modern Lenape is the smallest of them all, being a mere Papoose. He has shown himself worthy of the illustrious name he bears, having already turned in a feat of strength and endurance that hasn't been approached by such a little fellow. He has been all the way to visit his friends, the Seminoles, in Florida and back without a moment's stop.

The Lenape Papoose is an engine for the flivver plane. In one flight it better than tripled the distance record for planes of its class, and almost doubled the time in the air. The new record is an airline distance of 2390 miles as against the former record of 716 miles; 63 hours, 55 minutes, as against 36 hours, 18 minutes.

Pilots Kenneth Kress and Glen Englert took off from Newark Airport at 4:05 E. S. T., Tuesday morning, May 17th. They had 38 gallons of gas and 12 quarts of oil; radio, food, refueling rope, and all of the paraphernalia that goes with a long flight. The gross weight at take off was 1324 pounds. This figures out to be a power loading of 26.48 pounds per horsepower. Some load for any engine! All this weight was jerked off the ground in 17 seconds.

The trip to Raleigh was against head winds, in fact all of the trip down was against strong head winds. Raleigh, the first refueling point, was reached at 11:30 A. M. In an hour and ten minutes they had enough gas to take the two pilots, their little ship and sturdy engine on to the next refueling point, Jacksonville, Florida.

The time of arrival at Jacksonville was 10:05 P. M. and they got away at 11:00. During the time at this city the boys hauled up 30 gallons of gas and 11 quarts of oil, as food for the motor. But the pilots were getting hungry too, since the food that they had taken with them was long gone. So up went sandwiches and milk to speed them on their way.

By this time the gods of the storm thought it time to play their joker. They mixed a dose of ground fog with the smoke from the everglades which had been burning for weeks. Kress and Englert shoved out over this with the moon shining feebly through high thin smoke. All would have been well, but the joke wasn't over. The beam went bad. They were over a strange country at night with nothing visible on the ground and the beam covered with static when it wasn't fading to nothing. Though it added hours to an already tough grind, they returned to Jacksonville and cruised around till daylight. After taking on more fuel the boys started out again at 8:20 A. M. and arrived at Miami at 1:15 in the afternoon of May 18th, Wednesday.

The trip was half over. Now for the trip back. They took on 20 gallons of gas, food and water, and off they went at 2:20 P. M. Up, up they climbed to get over the worst of the smoke. The lightplane pilots watching that Miami take off wondered what made the little ship step out so friskily after such a long hard trip and in such warm weather. They talked of roping it cowboy fashion to find out how it could romp out like that. Their own little ships had a hard struggle to get off the ground at all on such a hot day.

The modern Mohican was now on the homeward trail over the smoke, back to Jacksonville. It arrived at 7:10 P. M., and was refueled in 30 minutes, but Jacksonville had an unknown attraction for the storm gods. To the north the weather was closing in. The reports were that in some places even the birds were walking! No weather to start into at sundown, and so the only thing to do was to circle Jacksonville another night.

Finally after a fourth and last refueling from the Jacksonville field, they got away at 5:00 A. M. Thursday, May 19th. The good old sun chased the fog away but the clouds refused to run. At least the wind hadn't turned around, it had just quit. They reached Raleigh in time for lunch, but there was no time to eat. More gas and they were off at 1:20 P. M. on the last leg of a long, hard trip.

Old Man Weather, the bane of the flier, was up to his tricks again. Baltimore reported 5000 feet and 10 miles, Trenton 3000 feet and 8 miles, Newark 2000 feet and 7 miles, slight rain. The ceiling was coming down from the north. In the net report Baltimore was down to 3500 feet and 8 miles, Trenton 1700 feet and 7 miles, Newark 1200 feet and 6 miles. Still the roof was falling. It was a race against the lowering ceiling to get in before it closed down tight. One heartening thought, the weather was holding off behind and there was an emergency refueling crew at Baltimore.

Still the clouds same down as the sun set. Trenton reported 1200 feet and 5 miles, Newark 1000 feet and 4 miles, raining. Lower and lower they were forced to fly, but Newark couldn't be far off now. There! Right ahead was the green and white beacon of the airport. Down they came and landed at 8:00 o'clock on the button, 63 hours and 55 minutes in the air. Gee, it felt good to stretch out again! Two hundred eighty-eight gallons of gas and 19 quarts of oil are a lot to haul up on the end of a rope.

The Little Lenape was ready to start out again the next morning, this time in easy stages to the great valley of the Mississippi.

How to Build the Loire S.E. 200

The S.E. 200 is a typical example of what new oceanic flyingboats will look like when completed. Air France recently showed preference for the Latecoere 631, another flyingboat with floats that retract up into the engine nacelles, when she ordered three of them. There may have been a smack of politics mixed in with the order, for the S.E. 200 seems to be much the better airplane and there has been some dispute over the selection. Two Cams 161's were also ordered so perhaps eventually the S.E. 200 will also become a member of Air France's fleet.

New Gnome-Rhone P-18, development of the L-18, engines will be used, providing 1,650 horsepower each for take off. Gross load of the ship is 134,920 pounds which makes it the "giant of giants." This plane is the largest we have ever attempted to build a model of, but it should not be difficult. Note the smooth simple lines.

As usual purchase a good grade of balsa wood, getting dimensions from the accompanying plans. Also get a tube of quick-drying, colorless model cement and some dope or lacquer. The color scheme on the big ship has not been decided as yet, so your paint job will be optional for the present anyway.

Draw the top view of the hull on stock first, with the grain of the wood running lengthwise. Cut around the outline with a jig-saw and then draw the side view and cut once more. The cross-sections will show you how to cut the finishing touches. A razor blade and sharp chisel may be most easily used in shaping the contours.

Make the wing in two sections, a right and left wing panel. Be very accurate and be sure grain of wood is running lengthwise as it makes it easier to work with and insures better strength. Draw the plan form of the wing and cut. Taper the panels as shown in front elevation and then shape out the airfoil. Go over the surface of the wing and the hull with coarse and

BROWN JUNIOR MOTOR . . . MODEL D . .

This champion power plant... yours for only

$10

COMPLETE with coil and condenser

MODEL D SPECIFICATIONS

Bore, ⅞". Stroke, 1". Weight (bare) 6½ oz. 1/5 h.p. R.P.M. 1200 to 10,000. Height 4¾" (including spark plug). "Z" metal counterbalanced crank-shaft. Connecting rod of forged aluminum alloy.

Like all other Brown Junior Motors, Model D is block-tested before shipping and guaranteed against defective workmanship or materials.

THE BROWN JUNIOR MOTORS NEW SPARK PLUG. New and improved design. You'll find this the best spark plug on the market for models. It is not an adaptation of the automobile type spark plug, but a special design for model motors. It gives you a concentrated spark for easy starting. Oil free. Leak-proof. 65c

THE BROWN JUNIOR MOTORS COIL provides full strength spark at low speeds for easy starting. It is waterproof, oil-proof, gas-proof. Specially designed and precision built.

OTHER BROWN JR. MOTORS INCLUDE THESE OUTSTANDING PERFORMERS:

MODEL B: Special steel cylinder and steel piston retain compression and power after motor has been run-in. Chrome-molybdenum crank-shaft, practically shockproof. Rustproof finish, $21.50 complete.

MODEL C: Light weight combined with durability at the medium price of $17.00 complete.

MODEL M (MARINE): This model brings to marine motors the speed and stamina characteristic of Brown motors for model planes. $15.00 complete.

THINK of it! This powerful new Brown Junior Motor . . . complete, ready to fly . . . can be yours for less than you expect to pay for an ordinary motor *kit!*

If you're a veteran gas model-builder, this new motor will save you real money. If you have always wanted to fly a gas model, but have held back because of price—then, here's your opportunity to step right up with the best of them at a new low in cost.

The addition of the low-priced Model D makes Brown Junior Motors unquestionably the greatest line-up of motors on the market. Every model flyer can find exactly what he wants in a Brown motor.

BROWN JR MOTOR

Write now for full information on this amazing new motor! Use this coupon for a quick reply.

JUNIOR MOTORS CORPORATION
2545 N. Broad Street, Philadelphia, Pa.

☐ Please send me descriptive literature and details on the new Brown Junior Motor Model D.

☐ Please send me the name and address of the dealer nearest to my home.

Name .....

Address .....

City and State.....

Brown JUNIOR MOTORS

BUILT TO OUT-PERFORM!

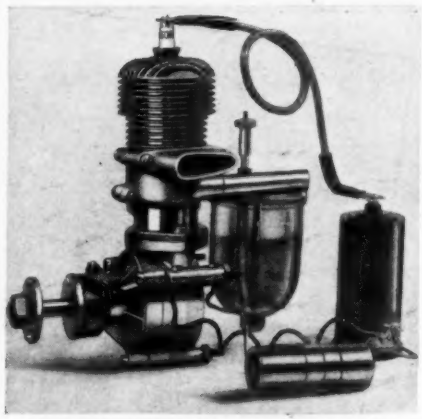
Ohlsson Gold Seal Miniature Motors are built to give that extra margin of performance which makes the difference between an ordinary motor and a champion! The combination of finest raw materials plus the most skilled engineering in the industry produces in Ohlsson Gold Seal Miniature Motors a degree of performance that is seldom equalled and never exceeded.

Ask your dealer about Ohlsson Gold Seal Miniature Motors and the Ohlsson Pacemaker Champion, the sensational ship that has been winning California model meets for the past two years.

Watch for Announcement

See the next issue of this magazine for complete details on Ohlsson's new and smaller miniature motor. As a rugged little brother to the Ohlsson Gold Seal Miniature, this motor will find a hearty welcome from the builders of smaller models.

Winners of Ohlsson's Cash Prize Contest will also be announced in the next issue of this magazine.



Ohlsson Gold Seal Miniature Motor, pretested and guaranteed **$18.50**

Pacemaker Kit for building Ohlsson Pacemaker California *Champion*..... **$10.00**

Ohlsson Gold Seal Motor and Pacemaker Kit ready for complete assembly..... **$25.00**

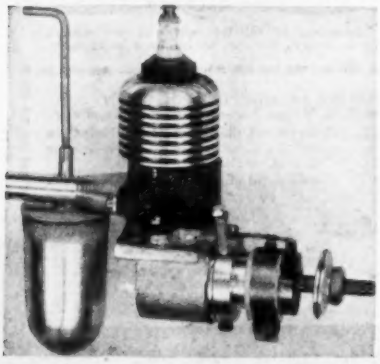
OHLSSON MOTOR DISTRIBUTORS

AER-O-KITS (SHEFFIELD), Hanover Works, 135 Scotland St., Sheffield 3, England; BOND'S O'EUSTON ROAD, LTD., 357 Euston Road, London, N. W. 1; MODEL AIRCRAFT STORES, 127b Hankinson Rd., Bournemouth, England; R. STAB, 35 Rue des Petit Champs, Paris, France; ESKADER, Narvapalatset, Gumshornsgatan 8-9, Stockholm, Sweden; HONOLULU PAPER CO., Honolulu, T. H.; MODEL AIRCRAFT (PTY.) LTD., P.O. Box 1906, Capetown, South Africa.

OHLSSON MINIATURES 630 NORTH ALVARADO STREET LOS ANGELES, CALIFORNIA

PARMELE & STURGES
INC.
51-A Crown St., New Haven, Ct.
Are Eastern Representatives for
PEERLESS
MODEL AIRPLANE
SUPPLIES
Dealers—Write for circular and prices

TROJAN JUNIOR
HIGH POWER! DURABILITY!



THE ONLY MOTOR USING **ROLLER-BEARINGS!** WILL outperform and outwear any motor of its size on the market. TROJAN MOTORS are used by all LEADING model builders. **WE INVITE COMPARISON!** See your dealer or write for folder. Shipped with coil and block—ready to run..... **$18.50**

TROJAN MINIATURE PRODUCTS CO., 6826 Sunset Blvd., Hollywood, Calif.

then fine sandpaper, until smoothness is obtained.

Use the same procedure in making the wing floats as you did the hull. The tail surfaces may be shaped easily from sheet balsa with your razor blade. The best way to make the engine nacelles is to round out a long piece of wood in cross-section and cut off six pieces about the length of the nacelles. Then shave down with razor blade where necessary. They will fit into the grooves cut into the leading edge of the wing.

The propeller blades and float struts may be made from small scraps of wood. Make six propeller hubs and to these cement three blades each. Straight pins may be used in connecting the propellers to the nacelles. Incidentally the propellers that will probably be used on the big ship will be American-made Hamilton Hydromatic full-feathering props.

In assembling the model put the hull in flying position or "on the step" on a flat surface. Join the wing to the hull with plenty of cement. Prop the wings to hold them in place. Join the tail and then the wing floats. The nacelles come next. Then touch up all connections with cement once more. After cement has thoroughly dried go over the entire model with fine sandpaper.

Brush off all dust and begin the paint job. Many coats will have to be applied before a smooth finish is obtained. Do not apply a second coat until the first has dried. It might be well to sandpaper the model after the first coat is applied to get an even smoother finish. When the paint job has been finished your model will be completed. If you wish you may build a stand as suggested in the plans, or one to your own design. Metal stands may also be purchased.

Our Air Force Tests Its Strength

(Continued from page 5)

tion that a Black force of four battleships and eight aircraft carriers was approaching the northern part of the coast, bound for New York or Boston, and a squadron of two battleships with four aircraft carriers was headed for the coast of the Carolinas. Still a third force was headed toward the coast of Norfolk, Virginia, but the spies let General Andrews down there, and he had to find out about this group for himself.

The rest was up to him, and he was given 188 planes to work out the defense problem. These consisted of seven squadrons of bombers (mostly Douglas B-18s, with a few of the giant four-motor Boeing "Flying Fortresses"), four squadrons of attack planes (A-17s, and four squadrons of pursuit (P-35s, PB-2s, and P-26s). Note that the composition of a GHQ Air Force is very peculiar. It has no observation planes, because it has nobody to observe for; no light bombers, because all its attacks will be on major strategic objectives that call for the heaviest machines available; no scouts because the service of information is the work of the regular army corps units.

General Andrews' first job was to locate the larger Black force on the ocean and find out where they were headed for. There were no ships available to play at being the enemy, but the Italian liner *Rex* was known to be approaching the coast somewhere, and the umpires informed the general that if his machines could find her and report her position, they would consider the enemy discovered. May 11th was the opening of "hostilities." The next morning Andrews sent three of his four-motored Boeings out to find the enemy. It was very bad weather, with violent rain and hail squalls over the ocean, and the air so bumpy that one of the giant machines dropped straight down 500 feet into an air pocket at one time. The visibility never got above three miles and most of the time was about three hundred yards, but 630 miles out over the Atlantic, one of the three giants burst through a run of clouds, right over the *Rex* —a wonderful piece of navigation. Score one for the GHQ Air Force.

Meanwhile General Andrews was being handed reports (from spies, army scouts, navy scouts) saying an enemy aircraft carrier had been sighted off Cape Cod. Also Black planes had bombed and damaged the airports at Boston and Providence, and men from other Black air transports had effected landings at the Penobscot in Maine and on Kitty Hawk Island off the coast of the Carolinas.

Andrews turned out his bombers to deal with all three menaces. A flight of B-18s, with pursuit to protect them, went to take care of the aircraft carrier which had bombed Boston. Attack planes and bombers went to the Penobscot, and more bombers with attack and pursuit aviation in support, were rushed down to Kitty Hawk

which seemed to represent the most serious threat from the enemy. The landing on the Penobscot, he knew from his previous information, must be rather weak; the ordinary army planes could deal with it.

The American bombers off Cape Cod found a long slick of aluminum dust floating on the water, far out in the ocean (another nice bit of navigation), to represent an aircraft carrier. It had been placed there by the umpires. The metallic powder, planted in this manner, makes an ideal bombing target, about the size and shape of a ship, the dust holding together and floating for days until it is blown apart. Andrews' bombers swooped on it out of the clouds, planting 100-pound sand bombs, each of which contained four pounds of powder to make the sand spread, while an umpiring airplane photographed results. The aircraft carrier was ruled sunk.

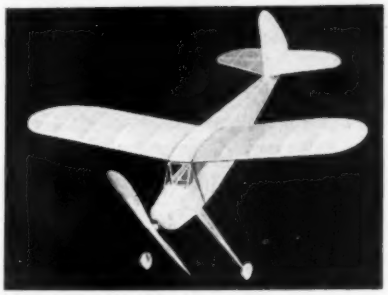
In the south the Kitty Hawk landing was so heavily attacked that the umpires ruled the Black force there of no further military value, incapable of more operations; though as usual, the army declined to give out any figures on the practise bombing that took place. But in the meanwhile, a flight of attack planes bound down the coast discovered that the Blacks had made a big landing off Norfolk, Virginia, set up piers and an airfield, and were landing large numbers of troops and tanks with an important aviation service.

This was, for the moment the most serious threat the defenders had to deal with, and as the defense army was supposed to be fighting the invasion in Maine, the GHQ Air Force had to take up the job of disposing of it. General Andrews arranged for a powerful attack on the Norfolk landing first thing in the morning, with 27 attack planes of the 8th, 13th and 95th Attack Squadrons, a flight of Douglas B-18s, and six of the giant Boeings, the last carrying 1,100 pound bombs. The Black piers were represented by lines of lime laid out on the shore. Their airfield was similarly indicated, and at the edge of it were a number of old condemned Keystone bombers, while the tanks and other army equipment of the Blacks were represented by worn-out army trucks. The idea was to give the bombers real targets to see how much damage they could do. Aluminum slicks floating on the water represented the invading ships.

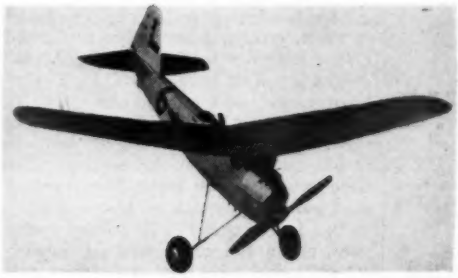
Andrews decided that the enemy establishments and force were too great for him to destroy completely with the limited force at his disposal. So he concentrated on paralyzing and crippling them by depriving them of fuel supplies. His bombers had special instructions to concentrate on airplanes on the ground, tankers in the water and anything that might look like a supply of gasoline. The weather was vile again, about as bad as it could possibly be, with low ceiling, mist and constant showers. The big Boeings, which require high altitude to do their work properly without coming under fire from ground guns, could not make it. They finally had to turn out to sea and drop their huge bombs harmlessly in the water. But the A-17 attack machines and the Douglas bombers got home so effectively that the umpires ruled the invaders were in bad shape for fuel supplies by evening, though as usual no precise details were given.

MODELCRAFT Special of the Month

30 in. PACIFIC ACE



A practical and durable commercial model. Easily constructed from well drawn and detailed plans. Kit contains an ample supply of first grade wood and high quality cement. This model really has what it takes to get places in your contest. Comparable and out-flies most dollar kits. **Price 25c plus 10c postage.**



THE NEW 1938 SCOUT

A Big Ship For Powerful Flying Powered by Midget, Dennymite, Cyclone, Ohlsson or Brown engine. The Scout is new throughout with 60" tapered Clark Y wing, new design, and parts with latest improvements. Kit contains formed landing gear, ready-cut ribs, formed face plate and cowl, switch, hook up wire, cement, dope, silk, full sized plans and Voit air wheels. Only **$7.25**

Prepaid in U.S.A.

Special money saving deal: Kit, Timer and Ohlsson engine ..... **$25.00** SAVE $2.25

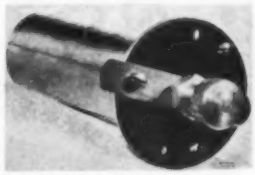
Same kit with bamboo paper and rubber Donut wheels **$4.85**

Dry Kit: No cement, dope, covering or wheels **$3.75**

THE FALCON

POWER WITH BRAT, TROJAN, HUSKY, ELF OR CHUNN ENGINE. Boys, here is the plane for you. Easy to build, and flies smooth as a Gull. 38" tapered wing. Kit complete with cement, dope, wheels, covering, printed ribs, formers, etc. **$1.50**

Deluxe kit with Traxler air wheels and silk covering **$2.95**



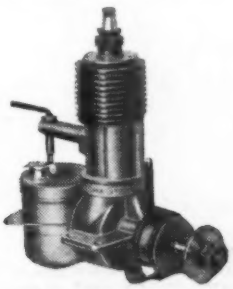
NEW FLIGHT TIMER

Adjustable from 1 second to 1 hour. Weight ⅝ oz. Accurate, reliable. Complete to drilled mounting holes. Ready to attach wires and install in ship. The first dependable timer made just for models.

$1.25

BROWN JR. MOTOR

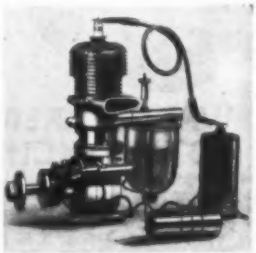
MODELCRAFT has been appointed Western Distributor for Brown Jr. Motors and will now carry a complete stock of motors and parts.



Model "D" $10.00

Complete ready to run with coil and condenser. The New Sensational Brown Jr. Model "D" at the low price of **$10.00**

Model "C" $17.50
Model "B" 21.50
Model "M" (Marine) 14.00



1938 OHLSSON ENGINE
1/5 H. P. $18.50
A high-powered unit

SOGARD PROPELLERS

49c

9", 12", 13", 13½", 14"

Yes, this same high-quality Sogard Propeller is sold at an amazingly reduced price. It is the prop with true pitch, accurate balance, maximum thrust and minimum torque. Take advantage of this sensational offer. Order today!

MODELCRAFT

7306 S. Vermont Ave., Dept. C, LOS ANGELES

THE LEADING SUPPLY HOUSE OF THE WEST

BUD WARREN Says:

The consistent performance of Bud Warren's 42" streamlined gas model in contest after contest proves that for real performance from a small ship a full-size 1/5 h.p. motor does the real job of flying.

"DON'T run a fever fighting a sick gas motor. You can now send in ANY old motor for a Warren rebuilt motor exchange described below. For a "red hot," brand-new engine, the Tom Thumb, at my special price of $7.50, can't be beat. Assembled and block-tested, I guarantee each engine full 1/5 h.p. Complete with fuel tank, coil, spark plug, one-piece cylinder and head and other modern features. Flying weight (less batteries) 10 oz."

HURRY. Send in your money order TODAY for one of these amazing power plants. I have a large supply ready for delivery.

WARREN REBUILT MOTOR EXCHANGE

Send me $5.50 and your old type Mighty-Midget or Gwin-Aero and receive an engine completely rebuilt to new specifications, with all the latest improvements. This exchange service includes complete rebuilt cylinder, new rings, spark plug, band point and insulation, spring points, condenser and gaskets.

The following are replaced with new parts, or rebuilt where needed: main bearing, crankshaft, crankcase, piston, con rod and wrist pin. Tank and carburetor rebuilt or new. Also new coil where needed.

Block-tested and set in first-class running condition, these engines are packed and shipped immediately. You must send in all engine parts, including tank and coil, regardless of condition, or include the factory list price of missing parts.

NOW! SERVICE for any engine

For $6.50 any gas motor, regardless of make or condition, exchanged for a rebuilt Mighty-Midget. All engines are eligible for this exchange.

WARREN SALES & SERVICE CO.

412 Bratt Street (Inglewood), Los Angeles, Calif.

☐ Rush me 1 new Tom Thumb Engine, I enclose $7.50.

☐ I am sending my old BUNCH engine and $5.50. Send me a rebuilt motor of the same type.

☐ I am sending my old motor and $6.50. Send me a "Mighty-Midget" rebuilt to new specifications.

Name.....

Street.....

City.....State.....

The attacks kept up through the evening, and the anti-aircraft units then came in for some practice also, serving as Black defenders of the threatened base. The first flight of attacking planes laid a smoke-screen down on the batteries, through which the artillerymen tried to pick up the waves of attackers and shoot them down with camera-guns.

The next day was also spent in bombing raids at Norfolk and in problems on ships at sea, with the results not announced by the army. Then came Sunday, during which the airmen took a well earned rest. On Monday all the high chiefs of the army flew off to Long Island for the "Farmingdale Blackout," the most spectacular feature of the maneuvers. This was not connected with the main purpose of the maneuvers at all, but was an experiment in defense against a night bombing raid. Farmingdale is the seat of the Seversky and Grumman aircraft factories, includes the big Seversky airport, and in war time would be a place of primary strategic importance.

Nine bombers were assigned to attack it at night, coming from a direction and at a time unknown to the defense. (Actually they flew off from Mitchel Field, only a "step away" as air distances go.) The ground defense was handled by the 62nd Coast Artillery, one of the most up-to-date anti-aircraft units in the services. They were equipped with eight 3-inch anti-aircraft guns, twenty-four .50 calibre machine-guns, a large number of .30 calibre machine guns, and a full complement of sound locators, searchlights and automatic laying devices. Supporting them was the 36th Pursuit Squadron, with its ten PB2 fighters. The local civil authorities were invited to assist and they promised to have all lights for a radius of two and a half miles around Farmingdale extinguished that night.

There was a good moon. At 10:38 six bombers suddenly soared across the sky at a height of 4,000 feet and began dropping long chains of magnesium flares, which hung behind them in the air like trails of stars, making the whole scene light as day, so that photographs were taken by observers both in the air and on the ground. The anti-aircraft batteries went into action with much noise and realistic flashings from their guns; the pursuit ships leaped into the skies; and far above, three more bombers, flying at 15,000 feet, carried out the actual raid by the light of the flares the first flight had dropped.

When it was all over the umpires ruled that two of the three high-flying bombers had succeeded in dropping their exploding eggs on the target and that the Seversky airport with its factories was practically destroyed. The army experts sat down to consider what they had learned. What had they?

With regard to the Farmingdale operation the main thing they found out was that it is extremely difficult to make the civilian population behave during an air raid. One of the stores in the town couldn't be bothered turning out its lights; and the event had been so much publicized in the newspapers beforehand that all the roads leading to the place were crowded with cars, their headlights all pointing in the direction of the menaced airport. These lights were spotted from the sky by the raiders and formed a most convenient guide for them. They were never in any doubt as to where their objective was. In other words the "blackout" was a failure.

Secondly, the pursuit squadron proved pretty much of a failure also. The umpires ruled they had shot down only one of the three bombers that did the actual raiding. Against these bombers the anti-aircraft battery also failed. Thanks to the glare and noise made by the first six, they never sighted the three at 15,000 feet and never even knew they were there.

The total conclusion would seem to be that there is no defense against a bombing raid, but the whole proceeding had an air of unreality that makes this doubtful. By the rules of the game the pursuit squadron was held on the ground till the sound locators picked up the noise of the approaching bombers. Under the conditions of real war a place as important as the Seversky airport would probably be defended by a patrol of attack or observation planes, especially on a moonlight night. These would spot the bombers a long time before the sound locators could on such a night, and by the time the latter neared their objective, they would have the whole nest of hornets around their ears. This is not theory, but what has been happening in both Spain and China.

Moreover, the success of the three high-flying bombers was made possible by the flares which the other six dropped. But those six flew at 4,000 feet, and everything in the last ten years shows that any plane whatever flying over a "batter" as good as the 62nd C.A. at 4,000 feet is a dead duck. In other words, if the anti-aircraft guns had been shooting bullets instead of blanks, those flare-droppers could never have gotten through at all; and what the high-fliers would have done without them is still an unsolved problem.

From the bigger maneuvers, in which the Farmingdale maneuver played no part, a great deal more was learned. The giant Boeing "Flying Forts" proved themselves right up to the hilt as long distance scouts, a purpose for which they were by no means intended, but which they fulfilled rather better than planes especially designed for scouting. Thanks to to their immense flying range, high speed, and the formidable character of their armament, which would give them good chances against hostile pursuit, they could do this. This was perhaps the most striking and unexpected lesson of the whole operation.

As to the problem the maneuvers were intended specifically to solve, that of the value of a GHQ Air Force, operating independent of army or navy, it may be considered as proved. The force went into action early and did most effective work, especially against the Norfolk landing, where it had to work under the worst possible conditions. General Andrews' ingenious idea of paralyzing the invaders by attacking their fuel supply was demonstrated as perfectly practical and likely to be valuable in a real war.

On the other hand the actual GHQ Air Force was revealed as far too small to accomplish any important results, being especially short of bombers of all kinds.

Planes that were ruled shot down had to be used over and over again in later phases of the operation; and in actual war they could hardly have done it. If an independent air force is to be used at all, it must be capable of delivering a really heavy and paralzing punch, like the blow at Norfolk; and this will take many more planes than the GHQ Air Force has now, and probably better ones.

Build the Messerschmitt Minute Model

(Continued from page 13)

Correct for spiral diving by applying opposite rudder and warping the trailing edge of the inside wing down slightly. Adjust for longitudinal stability by warping the elevator up if the model dives, and adding weight to the nose if it stalls.

N.A.A. Jr. News

(*Continued from page* 23)

City Park Avenue, New Orleans, La.

So there y'are, Jack! If you live in one of the above mentioned states, draw a circle around July 16 and 17, tie up your hair and go to it! Get those models in tune for what promises to be the biggest southern model meet in history. Good luck to you!

Models Get Wide Publicity

Roanoke, Virginia, is doing all right by itself these days. At the last report the club boasted 40 members when it was but twelve days old. They expect between 75 and 100 in a short time. These modelers are gas and rubber combined.

Models have been receiving an encouraging amount of newspaper publicity of late. A contest held at Kalamazoo, Michigan, under the sponsorship of the Kazoo Aeronuts, received quite a bit of advance publicity and all sorts of pictures, stories, etc. This is happening with gratifying regularity all over the country. Ed Clarke, out in Cleveland, Ohio, reports almost a full-page spread of pictures and copy following a gas model meet which drew a crowd of 8,000.

Bob McRaney, contest director at Birmingham, Alabama, directed a recent meet held at the Birmingham Municipal Airport on Sunday, May 1st. The meet was widely advertised in all three local papers and over Radio Station WSGN. Several hundred spectators turned out and police were required to handle the crowds. The meet was well conducted and according to N.A.A. rules. Bob broadcasted the details of the contest via short wave station WAXD and the program was relayed to WSGN and rebroadcast. A number of out-of-town entries were present.

An attempt is being made to organize a city-wide gas model club in Milwaukee, Wis. This proposed club would be represented by at least 100 members who have a total of between 150 and 200 gas models. In the main, the National Aeronautic Association is heartily in accord with such a proposition. It has been our experience that wherever modelers have banded together in this way, it has not been detrimental to the competitive spirit which is such a help to progress, but rather was of decided benefit to all concerned. The opinions of a united

for New Yorkers . . . . . .

A NEW MODEL SUPPLY COMPANY

–BESHAR MODELS–

"Meeting Place of the Champions"

A new company that has everything, quality, low prices, special gadgets and wood for the champions, because it's run by champions, Robert Meagher, Edward Beshar and Roger Desbrosses, all national winners and model builders for over 12 years. We know every type of model and have supplies for all. We do our own wood cutting, prop making, cement and dope mixing, so we know what's in it and how good it is before putting it up for sale. All our merchandise is tested, selected and approved for quality and reliability. See us if you need anything special—if we haven't got it, we'll make it. *Try us and let us prove our superiority!*

See Our Trophy Chest

A whole showcase full of trophies won by our boys, in every conceivable event. Let's also talk models and contests. We competed in the first N. Y. contests way back in 1925.

For Championship Performance BROWN JR. MOTORS

Meeting Place of the Champions

Our store is the premier showrooms of model airplanes. We can tell you and show you pictures of the best modelers, (Goldberg, Kovel, Zaic, etc.) in the old days.

See our display of contest models of all types including microfilm indoor planes.

Want to win contests? Let us help you, we know models, we should after 12 years of building and competition.

MODEL B.....$21.50 MODEL C.....$17.00 MODEL D.....$10.00

PARTIAL LIST OF MERCHANDISE WE STOCK:

OUR PRIDE AND PET PRODUCT "Beshar Precision Props" for outdoor, indoor and gas models. They are the finest and most efficient made. See them, try them and notice the difference in the performance of your plane. Prices are *low*. Get one of our tested single bladed props for experimenting.

RUBBER MODELS

Balsa wood in 11 different grades—from 3.6 lbs. for indoor to 11 lbs. for outdoor. Stock sizes or cut to your specifications. *Low* prices.

Cement and dopes mixed of virgin elements, comes in cans or bottles.

Colored dope mixed to any shade.

Microfilm as used by experts.

Rubber Lubricant from oldest and best formula—we were first to use rubber lubricant!

Wire parts, Ball Bearing washers, Threaded Bushings and Free-wheelings that simplify and improve performance.

Complete Kit Dept. and Approved Kits of: Comet—Megow—Denny—Berkeley —Scientific

GAS MOTORS

SYNCRO ACE 1938	$13.75
DENNYMITE AIRSTREAM	15.85
HUSKY JR. J.V. 1938	12.50
BRAT IMPROVED	16.50

Spark Plugs	65c	Timers	50c
Coils	95c	Silk, yd.	50c
BM Gas Mixt. Pt.	30c	Props	75c
Wheels 3½"	1.50	Prop Blanks	20c

GAS ENGINE STARTER

"Cadet" saves hands, engine and time, a wonder ..... $3.00 P.P.

SPECIAL USED MOTORS FOR SALE

All in perfect working order:

Mighty Midget	$ 4.00
Baby Cyclone	6.00
Trojan	12.00
Brat—used 1 hour	14.00

Certified Used Motor Department

Trade in your old motor. We will give you the very best allowance, regardless of make or condition. Write for estimated allowance.

MOTOR REPAIR DEPARTMENT. For $1.00 we will take apart, overhaul, clean and readjust your motor. Replacing of worn or broken parts is done free, the only charge being for the replaced part. Try us. We are experts.

"WATCH US AT THE NATIONALS"

BESHAR MODELS

NEW ADDRESS 329 EAST 54 ST., N.Y.C.

"Premier Model Airplane Showrooms of America— 1939 WORLD'S FAIR"

FLY-A-WAY CONSTRUCTION SETS

Giant FLYING MODELS

complete in every detail

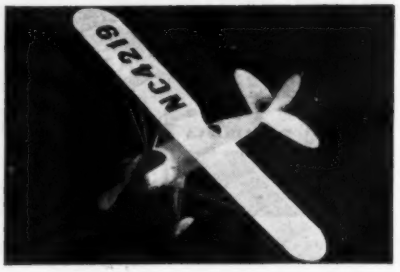
No. 601—60" DE WOITINE $2.50 mailing charge 25c
No. 602—50" HUGHES NORTHROP $3.50 mailing charge 25c
No. 603—50" ENDURANCE FLYER $1.50 mailing charge 20c
No. 501—45" DE WOITINE $1.00 postpaid

24" Detailed FLYING MODELS

No. 700 GRUMMAN FF-1
No. 701 ART CHESTER RACER

$1.50 Each mailing charge 15c

These kits will satisfy those who demand the best in their model airplanes—100% complete



24"-30" FLYING MODELS

24 inch	30 inch
181-MR. MULLIGAN	191-KINNER ENVOY
182-KINNER SPORTSTER	192-REARWIN
183-RYAN SPORTSTER	193-STINSON SR-8C
184-SEVERSKY	194-BELLANCA
185-CONSOLIDATED P-30	195-AERONCA C3
186-FAIRCHILD WARNER 22	196-DE WOITINE

at your retailer 25c each. 10c mailing charge.

Special! No. CR1 CURTISS ROBIN FLYING MODEL

Assembly Set $1.00 15c mailing charge
Here's a kit with ready-cut fuselage sides, wings, elevator, rudder, former, nose block and ribs. Appeals both to novice and experienced builder.

6" SHELF MODELS (New)

featuring a READY-CUT FUSELAGE AND DECORATED WING SERIES J-48

No. 1 Curtiss Hawk	No. 4 Seversky P35
No. 2 Northrop Pursuit	No. 5 SE-5
No. 3 Winnie Mae	No. 6 Akron Fighter

Just the kit for the beginner. 2 for 35c postpaid U. S. A.

48" Airplane Kite Construction Sets

K-48 MONOPLANE	50c	20c mailing charge
K-48 BIPLANE	$1.00	25c mailing charge

Printed parts, ready to assemble, tested and proven to fly for hours at 1000 ft. and higher. Positively a sensation!

Also many other 8" shelf, 16", 24" and 29" flying, 6" and 10" boat models and gliders to choose from. Send 5c for complete catalogue. If your dealer cannot supply you, order direct.

PAUL K. GUILLOW, WAKEFIELD, MASS.

club such as that proposed carry far more weight than those of individual and sometimes divided groups in the same community.

Modelers from Washington, D.C., Maryland, Pennsylvania, New Jersey, West Virginia, and North and South Carolina participated in the first annual Southern Atlantic Gas Model Meet held at Suitland, Maryland, on May 21st and 22nd. Mr. Frank Elvidge, N.A.A. Contest Director at Washington, D.C., sponsored the contest, which was so well attended by visitors that the most acute problem of the meet was where to put the cars of the onlookers. The meet was heralded by quite a bit of advance publicity in the local papers, and received very favorable comment from the participants, the gallery and the press. It is the first gas model meet to be held at Washington, and has done a lot toward awakening inspiration and enthusiasm in local modelers. Competition was very keen throughout the duration of the contest, and modelers are looking forward to next year's meet.

Eastern States Meet Opens Power Season

The Eastern States Gas Model Plane Championship Meet officially opened the east coast power-flying season. It probably rated the title of the "largest gas model meet" held thus far. Sponsored by the Metropolitan Model League and directed by the Polk Brothers, the meet was unique in that several new events were held for the first time. There were separate events for duration models powered with large and small engines, 5/8" bore and less being the dividing line. There were also separate events for flying scale models of both sizes. May 16th issue of *Life* Magazine carried a pictorial account of the meet. Possibly some of you have already seen the newsreels shots of this meet.

Academy Meeting

The next meeting of the Academy of Model Aeronautics will be held in Detroit immediately after the National Meet. A limited number of invitations have been sent to people in model aviation who are eligible for membership in this guiding body for model aeronautics in America. If by virtue of your long work in this field, the establishment of a national record or some special service to model aviation, you feel that you may be eligible for membership, send to the N.A.A. for an Academy application which will be presented before the Board of Admissions. The Academy's slogan is "By and For the Model Builder and Flier." If you are eligible for membership, model aviation needs your voice in the Academy. Mail your request for information and a membership application today.

And here is another point that may settle some unvoiced questions. Your license number is permanent until such time as you wish your membership to expire. By that we mean that you will put your license number, say 277, on every gas model ship you build and you will keep the same number from year to year, until you are ready to give up your membership.

How to Build a Payload Gas Model

(Continued from page 25)

the rest of medium balsa.

Cut these strips and sheets accurately, and fit them into their positions piece by piece, until you have a solid unit. The rounded cowl is made by cementing two side plates of 1/32" plywood to the outer flat sides of the motor runners, fitting flush against the first bulkhead. Into the angle formed by the side plates and the bulkhead (as illustrated) lightly cement the 1" x 6" x 6" 1/2 fairing blocks. When thoroughly dry, trim these to shape. After this is done, remove them, hollow them out, and recement permanently. The landing gear struts are bent to shape, and bound to 1/2" x 1/4" balsa strips; which are in turn strongly bound and cemented to the fuselage framework. An axle of 1/8" music wire will do much to strengthen the landing gear. The joining of the three struts near the wheel (which is, by the way, a 4-1/2 inch air wheel) is bound with soft wire, and either soldered, welded, or brazed. Wooden wheels may be substituted for the more expensive kind, provided their bushings are long and solid. After the internal bracing, the gusset plates and wiring circuit is attended to. The fuselage may be covered with heavy bamboo paper. Do not forget to provide for easy and quick access to the interior of the fuselage, particularly the battery box.

Wing

The wing is of simple construction and very little comment is needed. Just remember that, as in all other parts of the job, do not sacrifice strength for a few ounces of weight. The two main spars are made of very hard balsa; the rest of the balsa in the wing being medium hard. It should be hardly necessary to remind you that even a slight warp in the wing will cause a lot of trouble; so bear that in mind while covering the wing and tightening the paper. Brace all spars generously, where they are cracked for dihedral, with sheet balsa.

Tail

The stabilizer is built around a 1/8" x 1" spar that tapers to 1/8" x 1/4" at the tips. Since this is a full-depth spar, for strength, the 1/8" sheet balsa ribs are made in two pieces. The simplest way to take care of the airfoil taper in the tail is to accurately lay out the center rib and then cement in rectangles for the other ribs, trimming them to shape when the cement has dried. The method of mounting the stabilizer is shown in the perspective. The rudder mounting is basically the same, the front of the tail spar fitting flush against the rear of the tail block. The tail block is a piece of balsa measuring 2-1/4" x 1" x 8-1/2", and is grooved on its bottom to snugly receive a 1/4" square runner. Before attaching the stabilizer to the tail block, cement two tail hooks to the tail block one inch from either end. With the aid of these hooks, the tail assembly is firmly strapped to the fuselage with rubber. As in the wing, guard very carefully against warps.

The Prop

Use care in carving your prop (better make it props) for nothing can ruin the flying of a good gas job as an inefficient propeller. The prop shape in the plans is for use on the Brown Jr.; but make your prop to suit your motor. It should be heavy, well finished, and perfectly balanced for good results.

The "Details"

The parts of the gas job that we call the "details," are of so much importance that they should really be listed first. Perhaps the most heart-breaking incident that

MODEL RAILROADING

RAILROAD MODELS CAN RUN ALL YEAR ROUND ON INDOOR TRACK. LEARN THE THRILLS OF THIS NEWLY POPULAR HOBBY. **THE MODEL RAILROADER** HAS PLANS, PHOTOS, HOW-TO-BUILD ARTICLES. SEND 20 CENTS NOW FOR THE LATEST ISSUE, OR $2.00 FOR ONE YEAR SUBSCRIPTION.

THE MODEL RAILROADER
7610 W. State St. Wauwatosa, Wis.

we have ever seen in our gas job experience was the vertical dive of a slick, nine foot Monocoque, from about 500 feet. The pile of splinters, (not to mention the scrap iron that was once a motor) was the result of a careless tail mounting that shifted. The comparatively minor things on a gas job that we would call the "details" are:

1. The wiring circuit. . . .
2. The wing mounting. . . .
3. The tail mounting. . . .
4. The prop. . . .

If you are not prepared to spend a good deal of serious, painstaking work on these "little things," no matter how perfect the rest of your work is, stay home for gas job contests and do a little knitting; it's much more restful.

A Radio Controlled Powered Soarer

(Continued from page 10)

mitted signal of about 1750 kc., in contrast to the ultra-high frequencies which have been commonly used to date. The occupancy of this radio territory is comparatively sparse, and little interference is received or caused there. Yet radio equipment acts in a reliable, straightforward fashion, and fewer constructional bugs are encountered. Naturally, this frequency has both advantages and disadvantages; but the former do contribute markedly to reliability and simplicity of construction and adjustment.

The receiver consists basically of a two-stage pre-tuned r.f. amplifier and a grid-leak detector. The idling plate current of the grid-leak detector closes the relay, which opens the motor circuit. When a signal of a certain minimum amplitude comes along the detector rectifies and the plate current drops, opening the relay and closing the motor circuit.

The phrase "of a certain minimum amplitude" is quite important. The sensitivity of the receiver cannot be too great or a distant carrier, or worse yet, the local engine ignition noise will actuate it. Yet it must be great enough so that a moderate transmitter power and a modest antenna will provide adequate signal strength. In this case the receiver has a nominal sensitivity of 200 microvolts; that is to say, in the laboratory 200 mv. from the standard-signal generator will provide the one volt of detector input which will just barely ride the plate current down to 1.5 ma., where the relay is set to operate. But complete reliability is not had until the plate current dips to 1 ma. (the spring is set quite heavily so that shocks and jars or the heavy contact current will not affect relay operation), which requires two volts of input signal. This, in turn, requires a minimum field strength of perhaps 500 mv. A 50-watt-input transmitter working into 1/4-wave Marconi antenna-against-ground should give this over a moderate area.

The ignition problem is not altogether easy, but it can be licked without special precautions. The essential thing is limited receiver sensitivity. With the motor and all other metal in the installation bonded to the receiver chassis, it was found that the net effect of the ignition

FLY A Consistent Winner

"MADEWELL MITE" MOTOR

Takes 4 out of 5 Places in Recent Meet . . . .

In a recent state-wide meet for small motors the MADEWELL MITE captured 1st, 3rd, 4th, and 5th places.

In another state-wide meet for all comers and all sizes of motors, the MADEWELL MITE took 1st, 4th, and 5th places.

It's a consistent winner . . . establishing a new standard of power, efficiency, and easy handling in the midget motor class.

The MADEWELL MITE is not a toy, but a precision-built finely engineered fully tested miniature motor. Bore, 9/16"; stroke, 9/16"; weight, bare 4 oz.; complete flying weight with propeller and 2 penlight cells, 8 oz.

Built for ships with 3 to 4 foot wing spread, and boy! how it sends them into the air!

DEALERS: WRITE FOR INFORMATION

The Bumble Bee Also Wins

Of the above seven winners five were Bumble Bees, two of which placed first. The Bumble Bee is a swift, small, staple, practical ship designed especially for the small motor that has proven its ability to win contests.

The small size makes it one of the easiest models to transport. Kit is complete with M and M air wheels, full size plans, finished ribs and spars and all material needed to complete the model.

Specifications: Wing span 48 inches; length 29 inches; weight 16 ounces; complete with motor. Complete kit, $5.00 postpaid, or at your dealer's.

SKY DEVIL MODEL SHOP
3211 Filbert Street OAKLAND, CALIF.

MADEWELL MANUFACTURING CO.

MOTOR DIVISION
1180-25th Ave. Oakland, California

FOR BETTER PERFORMANCE—USE—

The "FLYWEIGHT CHAMPION" Ignition Coil for Gas Motors—Firecracker Type—Super Hot Spark insuring quick starting under all conditions—Case of molded Bakelite, clip and screw terminals, covered High Tension flexible lead. Weight 2½ oz., Height 2". "A FLYWEIGHT WITH A HEAVYWEIGHT PUNCH." **$2.00**

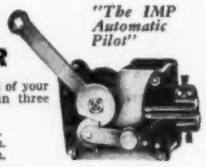
ALSO THE "MINI-KOIL"

Designed especially for the small gas job—Weight 1-2/5 oz.—Height 1⅝"—Complete with High Tension lead..... **$1.50**

Send 10c for complete catalog.

INTERNATIONAL MODELS CO.
251 W. 55th St. N. Y. City

International FLIGHT TIMER



"The IMP Automatic Pilot"

To insure absolute control of your gas model flights. Made in three types:

A—From 0 to 55 sec.
B—From 0 to 5 min.
C—From 0 to 20 min.

Weight—A and B, 2½ oz.; C, 4 oz.
(Type C for large planes and boats)

Vibrationless. Accuracy is assured as they have been made by foremost expert American clock and watch makers. For contest or regular flights. Each Postpaid... **$2.00**

"FLY WATE"—"A" type—0 to 55 seconds. Made of Dural—Weight only 1 oz. Postpaid **$2.50**

"IMP SPECIAL" Auto Knip—type Timer—1½x¾x⅝—Weight 1-2/5 oz. (Without housing ¾ oz.) Postpaid. **$1.75**

noise did not exceed the 200 mv. minimum provided the coil and condenser were correctly located. These should be moved around in the hand until the sphere of minimum effect is encountered. Had ignition noise been too bad, we were prepared to shield all of the ignition system, including the spark plug; and this may be necessary in more compact installations. In this connection, it may be said parenthetically that a carrier-operated system such as this is less subject to ignition troubles than one utilizing audio modulation, since the ignition pulses must have relatively enormous peak amplitude to produce a net signal level sufficient to simulate a reasonably strong carrier. This effect varies with motor speed, as well.

The receiver circuit is quite straightforward. An ordinary high-impedance antenna coupler is used. a compression trimmer serving as tuning condenser. The interstage couplers are ordinary 1600-kc. i.f. transformers, the diode input type being used because of its closer coupling, giving greater gain and less selectivity. Any coils of this general type, capable of tuning to 1750 kc., may be used.

It is notoriously difficult to build stable high-gain r.f. amplifiers with battery tubes, and it may be that instability may be encountered in duplicating the design, especially if the layout is altered. If oscillation occurs it is almost certain to be in the first stage, and may be eliminated by adding bias or lowering the screen voltage, or both. Reducing the latter to 22-1/2 volts is easiest, and will probably be effective. If this is done, the second 1B4 should be given a screen voltage of 67-1/2 to boost its gain slightly in compensation. If necessary, the grid return of the first tube may be opened and one of the very tiny "C" batteries now available inserted. No more than three volts additional bias should be necessary. The bias battery should be by-passed with 0.01 mfd.

The relay used is a 5000-ohm Eby. It is quite satisfactory, being rugged and dependable and of average sensitivity. A much more sensitive relay, costing considerably more, is the Sigma relay made for laboratory purposes in Boston. On test this relay gave very positive control with but 1/2 ma. variation—something that none of the so-called "half mill" relays we have tried have ever done except when too delicately balanced for flying. The importance of a reliable sensitive relay cannot be over-emphasized; it is the most critical single element in the system.

The battery complement comprises a total of six flashlight cells and two 45-volt "B" batteries. The total weight is about three pounds. One "B" battery could be used on the receiver with satisfactory results; the second is now used primarily to give higher idling plate current in the 1F4 (about 3 ma., in contrast to 1.5 with 45 volts). This adds reliability to the relay operation, but with careful adjustment it is not essential. Elimination of one "B" battery will cut the weight to 2 lbs., 2 oz. Both motor and filaments could be run from the same batteries, but a better plan is to use "penlight" cells for the filaments, with a further reduction to about 1 lb., 10 oz. Since the motor draws rather better than 1/2 ampere the use of smaller cells is impracticable on it.

While we're speaking of weight, if we add eight ounces for the d.c. motor to the minimum battery weight above, and then include about twenty ounces for the receiver (it could be made less by using de-based tubes, a lighter relay, lighter coil assemblies, lighter chassis construction) we get 3-1/2 lbs., the figure mentioned at the outset.

Viewed as a whole, this system has the significant advantage of using standardized principles, parts and methods throughout. Anyone of even limited radio and mechanical experience can be expected to duplicate it with comparative ease. Of course, a licensed operator must man the equipment; it must be used under a regular amateur station license; the carrier must be pure d.c. with no modulation and clean keying; and the call must be signed at least every fifteen minutes. But beyond these formalities no talents or training of a special nature are required.

All in all, this is a good system to use in getting started in the radio-control field. You know, this radio control thing is taking hold all over the country—and the reason is that it offers a thrill that can't be obtained from any other form of model activity; the thrill of actually controlling the movements of your own ship in flight. If you haven't yet gotten in on the fun, start today. Right now the ships are large, the control gear comparatively bulky and quite expensive. But with continued development this is all being

Sensational High-Powered Small Bore Motor

OPERATES ON NEW M & M 2-4 VOLT PEN-CELL COIL

Built for Power and Performance and Not to Meet Competitive Prices

M & M

SPECIFICATIONS

Bore 21/32" Stroke 22/32"

Weight of Bare Motor 3½ ounces

Total Weight, Motor, Coil, Gas, 7½ ounces
Ready to Run—Less Prop
Speed Range 500 to 12,000 R. P. M.
With M & M Special Designed Prop

STATIC THRUST 20 OUNCES

ONLY $17.50 Postpaid

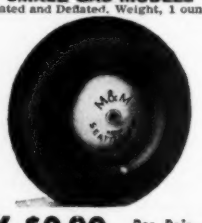
Complete and ready to run.
M & M Special Designed Prop $1.00 Extra Postpaid.
Exhaust Stack $1.00 extra. Postpaid.
M & M Special 2-4 volt coil designed to operate M & M motors on 2 pen-cells. Will also operate all larger motors more efficiently. Price $3.00 postpaid.

Obtain M & M Products from Your Dealer or send to Us.

M & M's NEW 2⅝" WHEEL

Designed for SMALL GAS MODELS

Can be Inflated and Deflated. Weight, 1 ounce per pair



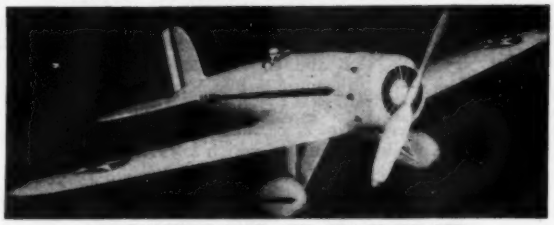
ONLY $0.90 Per Pair—Postpaid

M & M 3¼" GAS WHEELS $1.50 P.P.

M & M's FOR LARGER GAS MODELS 3½" & 4½" Gas wheels—weight 2½ and 5 oz. per pair.
Now only $2.75 per pair, postpaid
Size 6"x1⅞". Price $4.50 per pair P.P.
M & M Super Heavy Duty Wheel for Rubber Powered Models
SIZES 1¼—1¾—1½—1⅝"—PRICE $0.50 Per Pair. Postpaid.
SIZES 1⅞—2—2⅛—2¼—2⅜—2½—2⅝"—and Special Designed DoNut Wheels. Size 1¾"—PRICE $0.60 PER PAIR. POSTPAID. For Air Mail Add 11c.
All M & M Wheels can be inflated & deflated. If located in Washington add State Tax.
Dealers: Our New Discounts Are Very Attractive.
Builders—Send for Free Illustrated Literature.

M & M MODEL WHEEL CO.
325 North 79th Street Seattle, Wash.

NEW LOCKHEED P23A NAVY FIGHTER LAND AND SEAPLANE

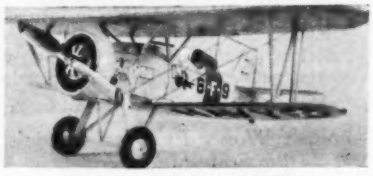


COMBINATION LAND AND SEA PLANE SET
32" Span. Length 20½". Weight 3½ oz. ¾" Scale.

PHOTO OF LOCKHEED SEAPLANE P23A MODEL

Model will rise from land or water in few feet. Construction set contains fuselage and pontoon formers, wing ribs, tips, etc., printed on balsa, a 3⅝" turned cowl front, 2 instrument boards, colored insignia, lettering, windshields, 9" carved scale flying prop shown, 3 oz. silver paint, 1 oz. cement, ½ oz. black, 2 oz. glue, ready cut wheel pants, strong 2" aluminum wheels, 12 feet of rubber, and large 33"x44" drawing of land and sea plane. This is a sensational model and only one of its type in the world. **$2.95**
Construction Set in labeled gift box, postpaid.....

BOEING F4B4 NAVY FIGHTER



22½" Span. Length 14½". ¾" Scale
Set has 3" celluloid motor, 3¼" tapered aluminum cowl ring, set of paints, etc. Postpaid.....$2.95

CURTISS NAVY HAWK F11C4

28" Span. Length 20½". 1" Scale
Finest equipped model in the world. Set has 4" celluloid motor, 4" cowl, set of paints, and full size drawing. Postpaid.....$4.90

CURTISS ARMY HAWK 75 OR P36A

37" Span. Length 27". 1" Scale
Latest 1938 Army Fighter. Set of paints and all parts. Postpaid.....$3.25
De Luxe Set with 4" celluloid motor and 4" aluminum cowl. Postpaid.....$4.00

LOCKHEED ARMY SPEED VEGA

41" Span. Length 28". 1" Scale
An unexcelled flyer. Set has colored paints, 11" prop shown, etc. Postpaid.....$4.95

NORTHROP A-17 ARMY FIGHTER

24" Span. Length 17". ½" Scale
Set has 7" prop, turned motor front, wooden wheels and complete set of paints. Postpaid.....$2.50

STEARMAN PT13 ARMY TRAINER

18" Span. Weight 1½" oz.
Set has 2" celluloid motor, 6" steel type prop, set of colored paints, full size scale plan. Postpaid.....$1.80

NOTE: These are the finest equipped models to be had. All parts printed on balsa. Each model has a steel type carved propeller as shown, full set of colored paints, paper cement, glue, etc.
All orders west of Mississippi, Canada, or Foreign, add 20c postage.

10c NEW 1938 CATALOG, 16 PAGES, LARGE 6" PHOTOS OF THE WORLD'S FINEST MODELS **10c**

MINIATURE AIRCRAFT CORP., Dept. D, 83 Low Terrace, New Brighton, New York

changed, and soon your ordinary eight-foot gas jobs will fly under radio control much as the larger ships do now. If you want to know how to do it when the time comes, start learning now.

Air Ways

(Continued from page 31)

which he has constructed in great detail. The method he used in creating this model is rather interesting. He obtained a kit for a complete scale model of the Curtiss Hawk. He then took the details from carefully made drawings of the Hawk and added them to the drawings of the kit. This is rather a unique procedure. All model builders who have detail drawings of large ships may, in this way, make fine scale models, using a commercial kit as a basis of their construction. The color markings on the model are those of the plane flown by Captain Ross G. Hoyt, Commanding Officer of the famous 17th Pursuit Squadron. They are correct to the most minute detail. The propeller is so perfect that it looks as if it had been made of metal, but actually it has been carved from wood. Thread has been used for the wing brace wires. Not just any thread, but thread which has been scaled down accurately to the correct size. Even the color has been carefully duplicated. The plane embodies all controls and cockpit details. The model required exactly one year to build, Moser spending a few hours every day on its construction. This model ranks as one of the finest in the country.

We spoke of Jim Cahill in the first part of this column. He sends picture, No. 2, of his ship which won the Moffitt contest, and the Air Ways Trophy last year. A few sidelights on this model are interesting. Cahill says he received the model back from the Nationals in November, after it had been out in the weather for four months, hiding away in some remote spot where it had landed after its long flight. He says:

"It was in quite a mess, having been the home of grasshoppers and ants, as well as being stepped on. I just finished repairing it and decided to take some pictures of it for Air Ways Club members."

Jim expects to be at the Nationals again this year and defend the trophy. Incidentally, he makes one or two comments of interest. He says:

"How about a bigger and better workroom at the Fort Shelby Hotel?" In regard to the number of events usually held at the Nationals, he continues "I think they are trying to have too many."

This year an effort has been made to cut down the number of events, as can be seen from the schedule of events which has appeared in the N.A.A. section.

In picture No. 3 you see a very fine solid scale model of a Sikorsky S-43. The model is only fifteen inches in wing span, though it looks much larger because of the careful workmanship. The fact that it is made of white pine undoubtedly has contributed to the fine finish and detail which is evident. The model was built by O. A. Small of 20 South Swain Street, Raleigh, North Carolina. Mr. Small has installed a light in the cabin, with a switch and transformer which allows him to use regular house current. He says the transformer is a small one, similar to those used on door-bells.

Next we have something very unusual. Picture No. 4 shows a Vought V-65 poised on a model catapult. This ingenious bit of modeling was created by Arnold Smith of 2887 Beechwood Boulevard, Pittsburgh, Pa. We regret that Mr. Smith does not give us any of the details concerning his work. He does tell us, however, that the picture was taken indoors with time exposure and a portrait attachment on his small camera.

Francis Smith of Creek Road, Williamsville, New York, gives evidence of "busy hands" in picture No. 5. Here he is shown with three of his models which he built recently. The one which he is preparing to wind is a model of a Korda cabin contest job. The model in the center is a "Flea" with which he has made a flight of two minutes, thirty-three seconds. The best time the contest job has made

The New PEE-WEE

AN AMAZING NEW MIDGET MOTOR
LIGHT - FAST - POWERFUL

Here it is! The sensational new pace-setting PEE-WEE motor that maintains Detroit's reputation as the Motor City! Built on sound engineering principles—a marvel of design and precision workmanship. Sturdy, dependable. A remarkable value.
Height 3⅛", length 4", weight including coil and battery 7¾ oz. Bore ½", stroke 9/16". Oilite oil cushioned bronze main bearing. Tool steel crankshaft. 3500 RPM with 10" prop.
Designed for planes up to 48" wingspan. This size of plane is rapidly becoming recognized as the ideal, due to ease of handling,—easily carried in ordinary passenger car. The PEE-WEE is the ideal motor for the ideal plane. Order now!

Assembled, Tested, and Guaranteed **$14.50**

Dealers write for information on your company letterhead.

DALLAIRE MODEL AIRCRAFT CO., Dept. N8, 9830 Wyoming, Detroit, Mich

BOYS! . . . HERE'S A REAL MOTOR!

is five minutes, eleven seconds. Smith tells us that this ship flies well with eighteen strands of rubber. We suppose he means 3/16" wide rubber. He says a flying club has just been started in Williamsville which uses a thirty-five acre farm as a flying field. They expect to have a number of fine contests this summer. Here is a chance for model builders in the vicinity to get together with Smith and put on a real show.

Billy Kay sends us picture No. 6, which shows him with his transition model, built from plans in the March issue of MODEL AIRPLANE NEWS. He says:

"I have had many good flights with my model and although I don't know how fast it will travel, I can say that it really moves without any delay. I have built many models from plans in M.A.N. and have had some good looking and good flying ships, but I think the transition model is about the best I have undertaken to construct."

Two very interesting solid scale models are shown in picture No. 7. They were constructed by Vincent Dornan of Bloomville, Ohio. Dornan is a solid scale model fan who has built a very large collection of ships. He says that, to date, he has spent approximately 500 hours on his collection. The ships shown in the photo are: left, Curtiss Hawk 75 (export ship), and the newest Curtiss pursuit, XP-37. The models have been entirely hand-made, from start to finish, and are exact replicas of the originals. The XP-37 has such details on it as: air scoops, gun troughs, pilot tube and fully retractable landing gear. It will be noted that Mr. Dornan has also acquired the art of taking excellent photographs of his models. Many fine models do not show up well in pictures because of poor photography by the builders.

Model fans will remember the name of Dick Everett of Tomlinson Run Park, Chester, West Virginia. Picture No. 8 shows him with his Class C fuselage job, which he designed and which was built by Jack Schnieder of Elm Grove, W. Va. Everett says:

"This job will average two minutes, thirty seconds, in any three flights, and turn in longer flights with a little luck. We expect to hold a contest soon as we wish to break a few records."

Everett hopes to make a try at breaking his own Clash C tow-line glider record, as he believes he can exceed his old mark. It is expected that all types of ships will be entered in the contest mentioned above.

CLUB NEWS

Pennsylvania

The Philadelphia Model Aeroplane Association of 1427 Spruce Street, Philadelphia, Pa., has held regular contests this spring. This association is under the direction of Mr. C. H. English, with Mr. Victor R. Fritz as Field Director. The final Novice Meet of the season was held on April 16th, at the 108th Field Artillery Armory. These meets proved very popular and helpful. The events were: R.O.G. Class A and B, Tractor and Pusher Class B and C. The P.M.A.A. have chapters throughout the metropolitan area of Philadelphia. An interesting note comes from No. 7, gleaned from the "P.M.A.A. News Bulletin," which says:

"Northeast's unostentatious young female, Kay Schwartz, who has received quite a share of publicity in model aviation circles, already is nosing out some of the lads. And as time marches on she becomes a more formidable menace to masculine superiority."

We find this is typical of many parts of the country. Young ladies, in increasing numbers, are taking up the hobby of model aviation. They appear at every contest and are doing some commendable work. More power to them!!

Fourth Works Progress Administration Scale Model Airplane Competition

The Fourth Scale Model Aircraft Competition, held under the auspices of the Works Progress Administration at the Boys Club of Pittsburgh, has proved a great success. Out of a field of seventy-five planes, from the entire county of Allegheny and the Pittsburgh area, the judges had a rather difficult task selecting any winners. This year a division was laid aside as Original Design in which a model of the entrant's ideas in regards to the newness of the planes to come, along with a plan of the same, was entered. The two outstanding of these were:

Ruddy Lazan, MODEL AIRPLANE NEWS Award.

Robert Barnet, Air Trails Award.

The winners of the different awards in the Junior and Senior Divisions of the Competition are listed below:

Senior Division

Aircraft Industries Award—Alex Szwojnowski.

Megows Award—Joseph Scuro.

N.A.A. Contest Director Award—Walter Flynn.

MODEL AIRPLANE NEWS Award—Paul Mathis.

Flying Aces Award—Wm. Devine.

Air Trails Award—Pete Yakich.

Berry Award—Robt. Barnett.

Junior Division

1. Wm. Engle—Peerless Award.
2. Andrew Hasley—N. A. A. Contest Director Award.
3. Earl Stehle—Scientific Award.
4. Ray Noon—Comet Award.
5. Edward McKay, Heath Award.
6. Christ Paul—Flying Aces Award.
7. Edward Dobas—MODEL AIRPLANE NEWS Award.
8. Bernard Burgiss—Air Trails Award.
9. Leon Borczyk—MODEL AIRPLANE NEWS Award.
10. Walter Gawlowsky—Comet Award.
11. Robert Beatty—Comet Award.
12. Michael Eannarino—comet award.

THUNDER BIRD WINS 1st PLACE . . . . . FLINT, MICH.

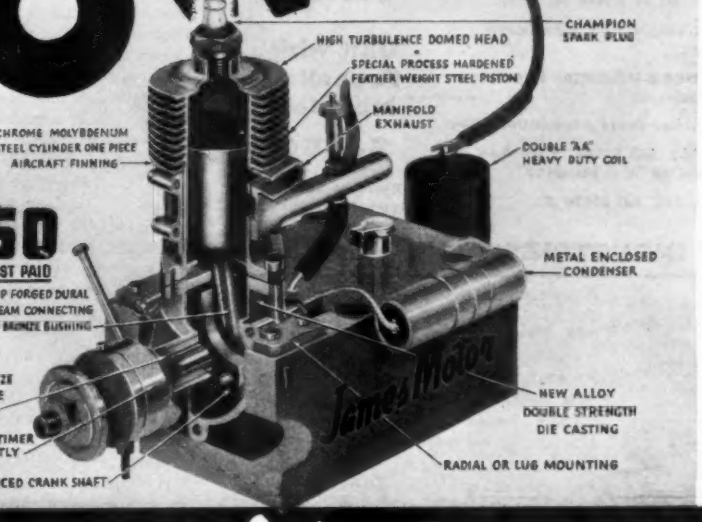
14 year old Robert Smith won 1st place at the Flint Model Contest, June 5th, when his 4 lb. THUNDER BIRD (with 1½ lbs. wt. added to this) flew for 1 min. 1 sec. on a 29 sec. motor run in a 15 MPH wind. Meets all N.A.A. contest specifications; takes off in 6', climbs approximately 600' per minute and soars on the slightest of currents. Employs R.A.F. -32- Wing Section.

Complete Kit contains all necessary wood, wire, cut-out ribs, shaped trailing edge, prop blank, celluloid, large cans of cement and dope and largest single sheet full size plans crammed with details. Complete, except for wheels.....$3.95 p.p.
With 3½" Streamlined Air Wheels.....$4.95 p.p.
Complete Deluxe Kit and latest type ready-to-run Mighty Midget Motor.....$13.95 p.p.
COMPLETE FULL SIZE PLANS (45" or 6')—25c plus 5c post. This sensational offer extended by popular demand.
Complete Kit for sensational 45" Thunder Bird, including wood, wire, cement, dope, shaped trailing edge, cut-out ribs, prop blank, etc. (except for wheels).....$1.95 p.p.
With Air Wheels and finished Prop.....$2.95 p.p.
Catalog free. Describes motors, accessories, supplies, etc. Dealers write.

NEW CYCLONE AIRCRAFT COMPANY, Dept. A1 397—11th Street, Brooklyn, N.Y.

Here's What YOU are Interested in—

POWER!


CHAMPION SPARK PLUG
HIGH TURBULENCE DOMED HEAD
SPECIAL PROCESS HARDENED FEATHER WEIGHT STEEL PISTON
MANIFOLD EXHAUST
CHROME MOLYBDENUM STEEL CYLINDER ONE PIECE AIRCRAFT FINNING
DOUBLE "AA" HEAVY DUTY COIL
METAL ENCLOSED CONDENSER
DROP FORGED DURAL "I" BEAM CONNECTING ROD BRONZE BUSHING
HARD PHOSPHOR BRONZE MAIN BEARING FORCE FEED LUBRICATION
ENCLOSED ADJUSTABLE TIMER THAT WORKS PERFECTLY
FULL COUNTER BALANCED CRANK SHAFT
NEW ALLOY DOUBLE STRENGTH DIE CASTING
RADIAL OR LUG MOUNTING
James Motor

$12.50 POST PAID

AFTER one year of engineering research and development, we are ready to present this new super-high-power lightweight model motor.

We have achieved easy starting, low idling speed and power plus performance at high speed. Our enclosed high-speed timer will perform accurately at any speed. We have developed a high-turbulence domed head, giving greater atomization and equally distributed power to the pistons.

You can't win contests unless you have power. The James Motor has everything any other motor has, plus POWER!

We will guarantee more power, smoother running, better performance, and longer life than any other motor. Assembled and factory-tested.

Order Your *James Motor* NOW!

Immediate Delivery

Send money order or cash

SPECIFICATIONS

Bore, 15/16"; Stroke, 15/16"; 2-Cycle; 4-Port; 1/4 Horse Power at 5000 r.p.m.; Weight Bare 8 oz.

James Motor

THE GREAT WESTERN AIRPLANE COMPANY, INC.
1700 W. ADAMS, LOS ANGELES, CALIF.

New York

We hear from the office of the National Director, John L. Scherer, who sends us a report of recent activities of the National Aero Reserve. This organization has headquarters at East Rockaway, New York, Box 35.

They will hold their third annual outdoor contest in Rochester, New York, late in June. The exact date has not been decided upon. The events are: Stick R.O.G., Cabin Endurance, Gull-Wing Stinson Flying Scale, Open Scale (flying). Prizes will consist of a miniature gasoline engine which will be given as first prize in each event. Other prizes are gas model kits, wrist stop-watch, model kits, air wheels, etc. Anyone who can travel to Rochester is invited to attend. For full details write to: "Times-Union," Rochester, New York.

Berryloid Model Color Contest

The recent Berry Brothers contest closed March 31st. This contest called for a letter of fifty words, or less, on: "The Value of Color on Airplanes," a label from any bottle or can of Berryloid model finishing material, and the outlined airplane on the face of the entry blank, colored to show what the contestant considered a desirable color scheme.

Prizes have been awarded as follows:

1. Mr. Richard Arbib, 115 Lafayette Place, Woodmere, L.I., N.Y., and consists of a Regional Denny Deluxe Denny Jr. kit and motor (called the Dennymite). The wing span on this plane is 6' 1".

2. Mr. Felix Gutmann, 710 Ninth Avenue, New York, New York, and consists of a Dallaire model airplane Motor.

3. Mr. Frederick Vandermeer, 13925 Grandmont Avenue, Detroit, Michigan, and consists of a high grade stop-watch.

The first prize letter reads:

"Colors suggesting stability, strength and power are valuable when patterned to accentuate the form of airplanes. Several values of a warm dark color with one contrasting hue best compliment the aluminum, improving exterior visibility and eye-appeal. Interiors can then be light; expressing solidity, repose and cheer to the passengers."

Illinois

Alvin G. Davis of 4046 West Granshaw Street, Chicago, Illinois, tells us that aviation classes are a part of the regular curriculum of the Recreation Board of Oak Park, Chicago, Illinois. Mr. John T. Carleton of Oak Park is doing a fine job as instructor for the Oak Park Aviation Club. The club now has 200 members, from ten to sixteen years of age, learning to build prize-winning models. Their training covers a complete, comprehensive course on model building "from A to Z." Over thirty-seven members from fifteen years of age up are in the flying classes, and many of these youngsters have already soloed. The flying course includes Department of Commerce regulations, aircraft construction and flying in all its phases. Eight members have gas models under construction.

THE BEST ENGINES

On The Market Depend For Their Performance On A

SMITH Ignition Coil

The following manufacturers protect their reputation by using the best coil available.

A. J. C.	LITTLE DYNAMITE
BABY CYCLONE	MADEWELL MITE
BAT	METEOR
BEE	MORTON
BRAT	CHALLENGER
CONDOR	OHLSSON
DENNYMITE DELUXE	PEE WEE
HERKIMER	PHANTOM
HUSKY JUNIOR	TROJAN
JAMES	WILLIARD

You too can benefit from their experience by replacing with the genuine article.

New primary terminals, mounting brackets and fibre strap, clip connectors on lacquered High-tension wire, weight 2½ oz.

Price $2.50

Save weight and win the contest with our NEW Model LIGHTWEIGHT coil.

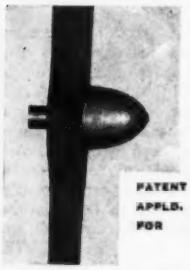
Beautiful Bakelite case and same high-tension leads as our other coils. WEIGHT 1¾ ounces. Price $3.00.

If you must have a big coil get our 5 ounce BIG SHOT that outperforms all others $3.50.

NATHAN R. SMITH MFG. CO.
1814 West 8th St., Los Angeles, Calif.

FREE WHEELING GAS MODEL PROPELLER HUB

AERO GLIDE The Only Perfected Free Wheeling Gas Model Propeller Hub



PATENT APPLD. FOR

FEATURES

- INCREASES Performance and Duration as Much as 25%
- LESS THAN 1 oz Additional Weight
- REDUCES Propeller Breakage to Minimum
- Machined from Aluminum Alloy
- INSTALLED EASILY on Any Propeller in 5 Minutes
- WILL FIT All Motors

Unit Complete $2.00

Unit with Propeller Mounted $3.00

Specify Size of Propeller Wanted

DEALERS WRITE

MODEL AIRCRAFT INDUSTRIES, 345 S. Winter Street Salem, Oregon

Wisconsin

The "publicity man" of Hangar No. 13, Y.M.C.A., Beloit, Wisconsin, writes:

"The club recently took part in the community hobby show and made an excellent showing. To make us feel good the judges awarded first prize to our display of models. Then, to top things off, we won many places in the individual competition. Places were awarded to: Conrad Hanson, Jr., advisor; George Niebauer, club commander; Wilfred Treder, club secretary; Ken Varner, Melville Spence and Jim Youngwith.

"There were numerous models in the show and those in competition consisted of fifteen finished and unfinished gas models, eight scale models, one stick model and two microfilm models."

Gas Lines

(Continued from page 30)

plane should prove to be a good contest winner when the engine is properly tuned.

The ship with which Frank Ehling won the "small" event bore a strong resemblance to Maxwell Bassett's early "Miss Philadelphia," but the structure and tail surfaces were more like those of a rubber powered ship. This four foot plane was the only real performer on the field and led Frank cross-country more than once, but each time it was retrieved with no damage.

The most unusual plane at the meet and the one which won for its builder, Charles Kinney of 247 Broadway, Newark, N.J., the prize for the best workmanship, was a nine foot, Brown powered pusher. This plane was designed by Ben Shereshaw and made its first flight at this meet.

It was necessary to add a pound of assorted wrenches to the nose of this crate in order to correct a tendency toward tail heaviness. It showed a swell steady climb and a smooth glide, but as luck would have it, the darn thing landed on the only barbed wire fence for miles around. The tires were ripped to shreds and the front wheel was pulled off, but the structure wasn't damaged.

Following is the list of winners:

Event No. 1

	Name	*Address*	*Time*
1st	Gordon Murray	2549 Bedford Ave., Brooklyn, N.Y.	11:58
2nd	J. Johnson	37 Grant Ave., New Brunswick, N.J.	11:30
3rd	Leo Schulman	1504 W. 7th St., Brooklyn, N.Y.	10:25
4th	W. Schreer	762 E. 3rd St., Brooklyn, N.Y.	10:19
5th	M. Schoenbrun	780 E. 2nd St., Brooklyn, N.Y.	9:50
6th	Abe Bacchi	1464 76th St., Brooklyn, N.Y.	8:07
7th	R. Gray	957 W. Fourth St., Plainfield, N.J.	5:05
8th	Zedtwards	5016 194th St., Flushing, L.I.	4:53
9th	H. Friedlander	2415 Beverley Rd., Brooklyn, N.Y.	4:05

Event No. 2

1st	Frank Ehling	51 Hancock Ave., Jersey City, N.J.	1:31
2nd	Geo. Tabery	24-32 21st St., Long Island City, N.Y.	1:05
3rd	Arthur Block	2330 Grand Concourse, Bronx, N.Y.	:53
4th	Howard R. Lay	350 No. Fullterton Ave., Montclair, N.J.	:24
5th	Gilbert Schuman	1363 Plimpton Ave., New York City	:21
6th	Henry Koninsky	120 W. 105 St., New York City	:21
7th	Ted Foti	1373 Brook Ave., Bronx, N.Y.	:08

The only feature that the contest did not embody was newsreels. At previous meets newsreels usually took shots of the activities. On this occasion they were specifically not invited because, in the past, they persisted in photographing crashes, to the exclusion of the successful performances of planes. Unquestionably their dramatic sense and desire for thrills motivated them in this procedure. However, gas model fans and officials of contests have felt that they did not give a true picture to the public of this activity, and in fact created a decidedly bad impression as to the merits of gas models and their function in training young men in aeronautics and other related sciences. In other words, rather than help the cause of gas models they have tended to harm it. They have simply worn out their welcome.

We call the attention of other gas model clubs and contest officials to this state of affairs, and for the good of the art urge them to take appropriate action in respect to the taking of "movies" at any contest over which they may preside.

A number of unusual photographs of the contest was taken. Picture No. 3 shows Charles Kinney with a large midwing pusher, which was designed by Ben Shereshaw. Usually this type of ship does not perform in a reliable manner. However, this plane disproves the rule, as it flies with great steadiness and has a beautiful glide. It uses a Grant X-8 wing section.

Picture No. 4 is one which may cause you to hold your breath. It shows Leon Shulman's model diving in over the public address system. It appears that the owner had difficulty in obtaining longitudinal stability with his plane. Perhaps it may have been due to the fact that a very high undercamber was present on the airfoil section. This often causes a large center of pressure movement forward and backward. We refrain from showing you the tragic end of this flight. Though such things are heartrending, it is only by means of these unfortunate incidents that faults in design or operation become evident. Often these are unavoidable, but usually if a plane is designed and operated correctly, crashes will not result.

Picture No. 5 shows a group of the prize winners with some of their planes.

In picture No. 6 a group of young gas model enthusiasts, who have extended their

Fly in the Sky - or-Skim over the Waves

6ft. Mr. MULLIGAN $1.00 plus 20c postage

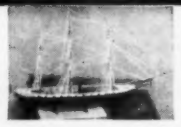
54" Stinson "Gull-Wing" $1.00 plus 20c postage

TAKE YOUR CHOICE! Here are a pair of large, sturdy flyers to satisfy every m.a. flying fan! BOTH have:—large turned nose, 4½" diameter — finished balsa prop—printed ribs balloon wheels (MULLIGAN has 3" finished wheels) — big bottles cement and dope—3 large sheets colored tissue —full size plans—simplified construction — everything needed (plus spares) to build either of these swell, guaranteed flyers!

A new "star" line of model boats is sweeping the hobby horizon. Thrill to the pleasure of building scale models of famous ships. Each kit contains all material to finish model from top-mast to keel. Special features are: stamped, easy-to-cut hulls, large bottles of colors and cement, brush, printed sheets and full size plans and instructions. All models between 10 to 15" in length. And best of all—only 25c each (plus 10c postage); 3 for $1 postpaid. Take your choice of:

BALTIMORE CLIPPER
U.S.N. INDIANAPOLIS
SUBMARINE NARWHAL
FARRAGUT'S FLAGSHIP
THE SEA WITCH
THE RANGER

25c each plus 10c postage



FARRAGUT'S FLAG SHIP 25c plus 10c postage

15 in. RANGER 25c plus 10c postage

Dealers-Jobbers write for money-making details.

Send for new 1938 Price Lists of Model Airplane Kits, Supplies, Motors and Specialties.

MERCURY MODEL AIRPLANE CO., Dept. M-8, 1592 Lincoln Pla., Brooklyn, N.Y.

inventive genius to the field of transportation, are shown. They are members of the Idlewild Gas Model Club. Some of them are preparing their models for the contest. One of the problems of a gas model builder is to transport his craft to and from contests. These young men have solved the problem nicely. They have built a trailer for their car in which their models may be carried, and which also acts as a workshop during the contest. A number of clubs have taken to this idea and have found that it saves them hours of work repairing damage caused by gas models being poked promiscuously in the backs of automobiles, or tied to the roofs of cars.

One of the interesting ships at the contest is shown in picture No. 7. It is James O. Wood's scale model of an Art Chester racer. Unfortunately this model did not have a chance to show how it could perform as it unavoidably cracked up at the take off.

A few interesting pictures of the contest held at Farmingdale, Long Island, New York, by the Metropolitan Model League have been received. News of this contest was given last month. Here are the photos:

In picture No. 8 Elton Ballas of 42-11 Junction Avenue, Cavona, New York, is shown with his unique model. Instead of a two wheel landing gear it has a twin tail skid and one landing gear wheel in the front. The double fin at the end of the stabilizer serve as skids. It has a seven foot wing span and weighs four pounds, two ounces, powered with a Brown Junior.

Philip Sagona was another contestant at Farmingdale. Picture No. 9 shows him with his most unusual ship, which he calls the "Flying Tadpole." The design is most unique.

Picture No. 10 shows Felix Gutmann of 710 Ninth Avenue, New York City, with his Brown powered smaller plane. The ship has a wing span of forty-six inches and a total area of 205 square inches. It weighs eighteen ounces. Due to the high wind Gutmann did not undertake to fly his craft.

Lawrence Low of 170 East 74th Street, New York City, also believes in the future of very small gas jobs. He is shown in picture No. 11 with his ship, which has a wing spread of only thirty-six inches and weighs fifteen ounces.

Thracy Petrides has long been known as an exponent of small planes. Picture No. 12 shows Fritz Sebek of 45-36 Robinson Street, Flushing, New York, with a plane of Petrides' design. It has a span of forty-eight inches and weighs 2-1/2 pounds. It is powered by an inverted Baby Cycline engine.

Picture No. 13 shows a group of contestants at the Midwestern States Gas Model Contest, sponsored by the Chicago Aeronauts Club and the Chicago Parks Board. This contest took place sometime ago; nevertheless it shows the activity which is taking place in the neighborhood of Chicago. Holding the model GMA-5 at the left is Al Saloman, 1937 Chicago Champ and winner of the contest. To the right of Saloman, and supporting the wing of his plane, is R. L. Weber of Chicago, who is one of the Contest Advisors for the Northern Indiana Model Airplane Builders' Contest held in Gary, Indiana. Gene Shipman, young Gary entrant, is seated behind his ship in front center. Bob Roberts, Contest Director, is standing at right front and looking toward the center of the group. The largest plane entered had a span of twelve feet, eight inches, and was powered with a 1/3 horsepower motor. This was a special job belonging to Walls C. Shreffler of Joliet, Illinois.

One of the big contests recently held in the East was sponsored by the Philadelphia Gas Model Airplane Association. It was their first annual contest, held on May 12th, at the S. Davis Wilson Airport in Philadelphia, Pa. About 150 contestants took part in the events. The contest was one of the most successful in the Philadelphia area. George Aspiotis tells us of some of the activities.

Flying started at 10:30 A.M. and ended at 5:30 P.M. A stiff wind handicapped the contestants somewhat, but the times made were quite good for the thirty second motor run allowed.

There were about twenty Philadelphia policemen on hand to handle the crowd. Much credit is due them for the very orderly manner in which the contest proceeded, this being one of the features of the meet. At no time were contestants handicapped by spectators being in the flying

AGAIN Bay Ridge Scoops the Gas Model Field With

THE BAY RIDGE MIKE

Wing Span 48" Length 32" Weight 20 ozs. with engine

The "Mike" is a small gas job especially designed for miniature motors having a bore of 5/8" or less. Its keen lines make a beautiful looking model, just the thing you want for the coming contest.

Kit includes full size plans, printed sheet balsa, cut out ribs, large cans of cement, clear dope, colored dopes, bamboo paper, shaped propeller, wire and many other parts to complete the model.

Complete Standard Kit (Without Airwheels) **$2.50 P.P.**

Deluxe Kit with M & M Airwheels, Silk for covering, and finished propeller **$3.50 P.P.**

Full Size plans and Instruction **.50 P.P.**

GAS POWERED SUPPLIES—*The Best Obtainable*

FREE with every order of $1.00 or over we will give 1 pint of cement and free postage in U.S.A.

BALSA
5 Ft. Lengths

1/8x1/4	.4 for .10
1/8x1/2	.3 for .14
1/8x1	.2 for .15
3/16x3/16	5 for .25
3/16x1/2	2 for .10
3/16x1	2 for .19
1/4x1/4	.6 for .25
1/4x1/2	.4 for .25
1/4x1	.3 for .25
3/8x3/8	.3 for .25
3/8x1/2	.3 for .27
1/8x1	.1 for .15
1x1	.1 for .25

BAMBOO PAPER
24x36 ..each .05

GAS MODEL BALSA

36" or 18" length of gas model balsa can be had. See our regular list of model supplies below. Please mention its use.

SHEET BALSA
5 Ft. Lengths

1/32x2	2 for .15
1/16x2	2 for .17
3/32x2	2 for .20
1/8x2	....2 for .23
3/16x2	....2 for .27
1/4x2	....2 for .30
1/2x2	....2 for .25

Double the 2" price for 3" widths.

HARD ALUMINUM SHEET

1/16x3x12	.28
1/32x3x12	.15

COVERING SILK
1 Yd. 36x36 .45

AIRCRAFT SPRUCE
5 Ft. Lengths

1/8x3/16	1 for .04
1/4x1/4	1 for .05
3/16x3/16	1 for .07
3/16x1/2	1 for .10
3/16x1	1 for .15
3/16x3	1 for .40
1/2x1/4	1 for .09
1/4x1/2	1 for .14
1/2x1	1 for .17
1/4x3	1 for .45

HARD ALUMINUM ANGLE
1/2x1/2 per ft. .15

M & M AIR WHEELS

3½" pr.	$1.50
4½" pr.	2.50
4½" pr.	2.75

OHLSSON AIR WHEELS

3½" pr.	$1.50
4½" pr.	1.75

Gas Model Cement
Clear Dope
Colored Dope and Thinner

½ pint can	.35
1 pint can	.60

GAS MODEL PROPS

12"	.65
13"	.75
14"	.75
16"	$1.00

MODEL AERONAUTICS YEAR BOOK

This book contains more than 80 detail plans of both gas and rubber powered models.
Price $1.00 P.P.

ALUMINUM RIVETS

1/4" dia.	doz .05

STEEL MUSIC WIRE
5 Ft. Lengths

1/16 dia.	.10
3/32 dia.	.15
1/8 dia.	.25

SHEET CELLULOID
8x10 each .07

1/4" dia. ft.	.03
1/8" dia. ft.	.02

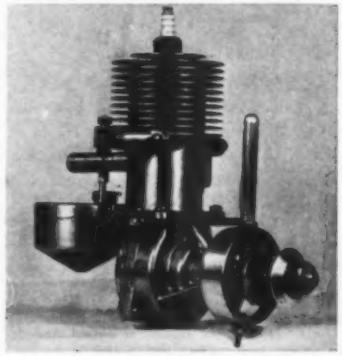
MIDGET FIRE-CRACKER COIL
Suitable for any type of engine. Wt. 2 oz. Each $2.50 P.P.

GAS MODEL TIMER
Easy to install can be regulated from 1 to 45 seconds. Each $1.75 P.P.

Ordering Instructions
Add 15c packing charge on orders for less than $1.50 in U.S.A.
All orders over $1.50 sent postpaid. Minimum order for 5 Ft. lengths is $1.00.
Canadian charges 25c extra. 5 Ft. lengths sent express charges collect to Canada.

BAY RIDGE MODEL AIRPLANE & SUPPLY CO.
232-45th Street Brooklyn, N. Y.

FIRST AGAIN



On June 5th, G. Ritzenthaler won FIRST place at the Northern Indiana Gas Meet, with his FORSTER Powered plane. One week later, on June 12th, Carl Goldberg's FORSTER Powered 4½ ft. plane won FIRST place by a wide margin, at the Chicago Gas Model Aeronauts Contest, limited to ships of 4½ ft. wing span or less.

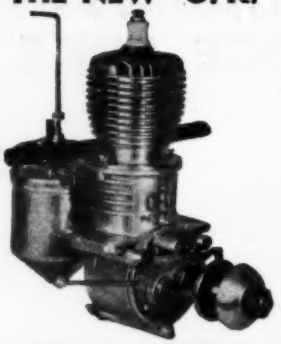
Need you further proof of FORSTER superiority? Let no one deceive you. Graduate from old worn-out ideas. You need Power! Whether large ships or small ships, when FORSTER powered, perform better, give you a greater chance to win. Ask the owners!

If you are building a **radio controlled plane**, your best bet is a FORSTER Motor. It is the lightest motor per horse power—the most powerful motor per unit weight.

Please enclose stamp for literature.

FORSTER BROTHERS
519 Lake St. Maywood, Ill.

THE NEW "O. K."



AN EASY STARTER!
A CONSISTENT PERFORMER!

A motor radically different with a newly developed cylinder free from welded, brazed, clamped or cast-on ports or passages (patents applied for).
Specifications: Bore .900"; Stroke 31/32"; Displacement 10 C.C.; H.P. ¼ plus; R.P.M.'s 1000-12000; Prop. 14" or 15"; Height 4-11/16"; Weight, bare, 7½ ozs.. radial or lug mounting.

Available in three models

"O.K." DeLuxe model with coil, condenser, spark plug, gas tank, exhaust manifold and air control..... $21.00
"O.K." Standard model with coil, condenser, spark plug and gas tank..... 17.80
"O.K." Special model with coil, condenser, spark plug and gas tank..... 11.80

Order through your Dealer or direct from

HERKIMER TOOL & MODEL WORKS
Dept. A **Herkimer, N. Y.**

FREE FREE

If we haven't got your name on our list of model airplane fans—we will send you a Surprise Gift of curious interest. Just send a post-card—and you shall have "IT" absolutely FREE!

HEATHE MODEL AIRPLANE CO.
260-M-8 Troy Ave. **Brooklyn, N. Y.**

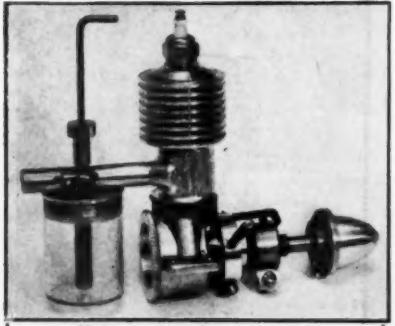
PLANS

Since 1932: EVERY MONTH a New List!
EVERY MONTH FIVE New Designs!

Send 10 cents for LIST No. 70 (23 pages) Indexes Plans for 130 GAS & 284 RUBBER Models.

A. L. JONES CO.
Box 31 **West Brighton, S.I., N.Y.**

ANNOUNCING
The 1938 model BRAT



Motor (as shown) ½ actual size

1938 FEATURES

Transparent and unbreakable gas tank. Tank may be filled from top and is easily removed for cleaning.
New and stronger die cast aluminum crankcase.
All parts on the 1938 model are completely interchangeable.
Precision finished to .0001" the Brat motor cannot be beat by any motor of the same size regardless of make or price for appearance, performance power and dependability. This has been proven in its two years on the market.
Bore 17/32", Stroke ⅝". Weight 3¼ oz. Shipped complete with coil, prop. condenser and can of s.a.e. 70 oil.
Do not be confused by motors with similar sounding names, remember it is spelled

B-R-A-T

Price $16.50 complete at your dealer or direct from us.

KEENER AIRCRAFT INDUSTRIES
2429 West Washington **Los Angeles, California**

area, nor were the spectators endangered by the models taking off.

Jesse Bieberman, Edward Manulkin and Jack Schwartz were Contest Directors, and handled the contest procedure with utmost capability. Due to their efforts this was one of the most orderly meets ever held.

Picture No. 14 shows the smallest plane and its builder, Steven Curtiss of Staten Island, New York.

Picture No. 15 shows Irwin Leshner's plane in full flight. The ship won second place. Leshner hails from Philadelphia. One of the unusual features of this plane is its diamond shaped fuselage.

Picture No. 16 shows the first place winner, Robert Jacobsen of Philadelphia, with his plane and his helper. He is preparing the ship for its final flight.

Picture No. 17 shows the line-up of entries from Atlantic City, New Jersey. Left to right, they are: Merrill Malley, John Ginnetti and Alwin Gaskill. Merrill Malley's ship deserves special mention. It has a monocoque fuselage of streamlined proportions. The stability and climb of this craft is enhanced by a parasol wing. The tips of the wing are beautifully streamlined.

News comes from Mr. A. B. Fruchey of 448 Center Street, Findlay, Ohio, telling us of the activities of the Findlay Gas Model Club. This club has been extremely active for a number of years and the enthusiasm of its members is not only unusual, but it has not diminished in the least. Picture No. 18 shows a six foot, seven inch gas job built by Bob Jeffrey, one of the club members. Jeffrey not only is a speed model expert, but also builds excellent gas jobs. Mr. Finday says:

"This ship though loaded twelve ounces per square foot, made a flight of one hour, one minute, with a twenty second motor run. Nevertheless, the club is highly in favor of a wing loading of eight ounces per square foot."

The heavy wing loading, as everyone knows, is supposed to shorten the flights of gas models, but this plane seems to have exploded that notion. The ship is powered with a Tlush motor.

Mr. Mickey DeAngelis of 473 Chestnut Avenue, Trenton, New Jersey, writes us and expresses some of his views on gas model flying. DeAngelis is president of the Trenton Area Club, former unit No. 20 of the I.G.M.A.A. He says:

"The small gas models using motors of 5/8" bore or less should be made a separate class. (The 'M' or Midget Class, and the larger bore gas models defined as Class E ships, over 300 square inches. The 'M' or (5/8" bore) Midget Class should be not over 300 square inches, (two square inches leeway) and the eight ounce rule should be used. For example, 144 square inches equal one square foot, eight ounces for every square foot. A ship having 288 square inches would only have to weight one pound. This would eliminate 'floaters.' Four or five ounces per square foot is not enough wing loading. As you can readily see, a model having forty-eight inches span, seven inches chord—4-1/2" chord on the tip —a fuselage length of twenty-five inches, weighing only fourteen ounces and using a Husky or Trojan engine, would really go to town."

DeAngelis also tells us that he has just finished a gas model design which will fit into any carrying case 1' x 1' x 41". It is a small ship, five feet span by forty-one inches in length. It can be powered with Husky, Brown or Baby Cyclone engines. This ship placed in the Metropolitan Model League contest, took first place in the Quaker City Gas Model Meet with a thirty second motor run and first place at the May 22nd contest held at Mercer Airport, Trenton, New Jersey. The entire ship may be built for a total cost of $4 complete, using materials from any of the model houses advertising in MODEL AIRPLANE NEWS.

The Trenton chapter of the N.A.A. are to sponsor an Eastern States Gas Model Meet to take place on August 21st, 1938, rain or shine. The official contest director is Lt. E. C. Plummer. Members of the Senior N.A.A. chapter will act as contest officials. It will be sanctioned by the N.A.A. Those who wish to enter may do so by paying 25c entry fee at the field. The contest will start at 10:00 A.M. After the contest has started the entry fee will be 50c.

The Philadelphia Model Airplane Association, taking advantage of its most favorable weather after many weeks of rain, held its final outdoor meet of the 1937-38 season. There were 71 contestants in a "neck and neck" race for City Championship between the Ace Chapter, led by Mr. F. Churchille and Mr. G. Miller, and Mr. Bieberman's unit. The Aces overcame an early-season lead of Mr. J. Bieberman's Northeast Chapter, 7 to 6, taking the last five meets in stride. The intense rivalry of these groups kept many veteran fliers from going to Lakehurst, as they had wanted to, in order to add their higher times to their Philadelphia Convention Hall record. It would have been interesting to know how much over the 21 minutes, 42 seconds of W. Lees, the 19 minutes, 57 seconds of D. Call and the 19 minutes for A. Koslow, these young men could make in the "big shed."

This was one of the most hectic days, with tempers keeping pace with the snapping rubber motors, and the old stand-by, "Mr. Thermal," out strong with his white, fleecy clouds in all directions. Average flight was being enjoyed until W. Lutz of the Ace Chapter hit the "big one" for 6 minutes, 3-2/5 seconds. Then the fun started. He was followed by commercials, single and twin pushers and more tractors in rapid succession, with the result that ten or twelve ships were clocked for good flights before being lost by their owners, and not returned.

C. Slight of the Aces repeated his hard luck of the previous week, when his commercial cleared the Delaware River at about 1000 feet, heading for the north Jersey pine belt. The ship has not been returned to date, and this was on his first official flight of over four minutes. He also lost his tractor when it hooked into a thermal. This leaves him without a ship for individual honors later in June.

AVIATION

APPRENTICES
BIG PAY **GOOD FUTURE**
If you are interested in training yourself for a highly paid position in the aviation industry — write, immediately, inclosing stamp.

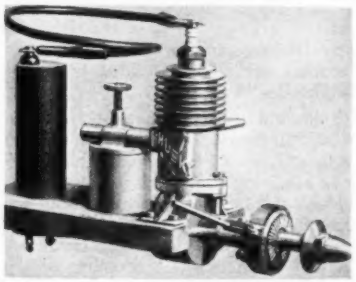
Mechanix Universal Aviation Service Co.
Strathmore Station **Dept. I** **Detroit, Mich.**

WE ABSOLUTELY GUARANTEE THE "HUSKY" TO GIVE 100% SATISFACTION

Recently we purchased half interest in "HUSKY" Miniature Motor Co., 1400 No. 45th St., Seattle, Wash. The "HUSKY" is built in our factory by only expert mechanics—no "HUSKY" leaves the factory unless it starts instantly and runs perfectly at all speeds—Special expensive metals are used for each "HUSKY" part. We have put the "HUSKY" through the most severe tests possible and not one single weakness appeared—the "HUSKY" is far under-priced and you will agree when you see and run it.

You Can't Buy a Motor at Any Price That Will Compare With the Brilliant New "HUSKY"

It's PRECISION BUILT—It's SIMPLE as ABC and FOOL PROOF—Can be Completely Disassembled in 45 seconds—The NEW AUTO TYPE Ignition System, using **Nathan R. Smith's** 1¾ oz. Two Pencell Coil. Starts the "HUSKY" QUICKLY with no effort and runs SMOOTHLY at any Desired Speed.



The NEW "HUSKY" runs Equally as well Upright or Inverted and was Designed to Fly Models Weighing from 16 oz. up to 3½ lbs. The "HUSKY" will run Steadily at any Speed from 250 R.P.M. to 6000 R.P.M. using either a 11" or 12" Prop. The NEW "HUSKY" is BEAUTIFULLY FINISHED THROUGHOUT—It is BUILT to WITHSTAND any TEST it is put to—Each motor is THOROUGHLY TESTED, RUN IN and FULLY GUARANTEED to GIVE you Consistent Performance and LONG LIFE. **⅝" bore, ⅝" stroke. Wt. 6½ oz. Including two pencells for Current.**
We are going to see to it that every HUSKY owner will be completely satisfied and a hundred per cent booster. You can't go wrong. **ORDER YOUR HUSKY TODAY! YOUR MONEY CAN'T BUY A BETTER MOTOR!**

Dealers Write for Special HUSKY Discounts

Husky motor mounts, wt. ⅔ oz., per pr., postpaid .50c
Husky Non Brittle prop. 11" or 12" each, postpaid $1.00
Husky complete ready to run (less motor mounts, batteries and prop.) Postpaid **$12.50**

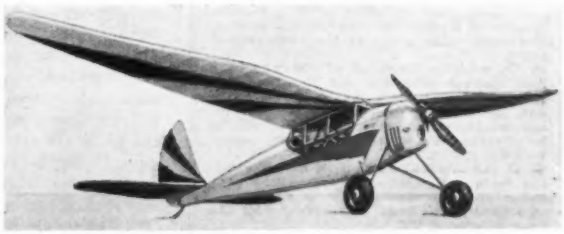
DOUGLAS MODEL AIRCRAFT CO.
Manufacturers Agent for
HUSKY MINIATURE MOTOR CO.
1400 North 45th Street, SEATTLE, WASH., U. S. A.

"DOUGLAS E-GULL" —GAS MODEL

UNPARALLELED Stability in Flight and Glide—Motor Safety Feature—High Performance Taper Wing—Shock Proof landing gear—Detachable elevator, rudder and wing. HONESTLY, you will say that it is Easiest and Strongest Model you ever built.

You need not worry about this model doing power dives, cartwheels, making unnecessary crashes etc. The new design eliminates all these hazards—for a more stable and consistent flying model you better buy an E-Gull.

SEND FOR FREE CATALOG OF GAS AND RUBBER MODEL SUPPLIES OF ALL KINDS, AND CONTEST MODELS THAT FLY MILES AHEAD OF THE FIELD



WINGSPAN 69" WT. 2½ LBS. INCLUDING HUSKY MOTOR. FULL SIZE DRAW-IN. All Wing Ribs and Body Formers Cut to Shape and Notched—Rudder, Elevator and Wing Tips Cut to Shape—Parts for Cowl—PenCell Holder Parts—Switch—Plug & Jack—Bracket for Elevator—Stripe Cut to Size—Landing Gear Shaped—M & M Wheels—Silk—Dope—Glue—Masking Tape—Celluloid Sheet—Nothing Else to Buy—Color Yellow and Red Trimming.

BUY TOMORROW'S MODEL TODAY

COMPLETE KIT Including Silk Covering ..... $8.50 (Add 35c Postage)
Including Bamboo Paper Covering $7.50 (Add 35c Postage)

While all these ships were enjoying their ride, W. Eggert Jr. produced the biggest thrill with his seven foot, silver, streamlined tow glider, which was clocked by P. Pierce, C. Wert and W. Berry for eight minutes, twenty seconds, according to the new regulations which do not permit timers to follow ships. Shaking itself loose from the regulation tow-line, it glided in a graceful, lazy circle at about 500 feet. This flight stopped all others—it was so good. Then the ship caught the edge of a big thermal and was soon only a speck. It was followed in a motor car, but was lost to sight when it entered a small cloud. Then the big surprise! When Mr. Eggert arrived home he was informed that the glider had landed in a gentleman's study. Upon inquiring as to the gentleman's name, he was none other than the President of the Board of Education!! The ship made an elapsed time of one hour, forty-three minutes. Trying to figure airline milage would be very difficult unless someone was following in a plane, but it is roughly figured at about fifteen miles coming from the new section of Philadelphia known as Mayfair, to the Chestnut Hill section.

Another meet was held by the Association at their new airport, but the day was unfavorable. There were low hanging clouds, a good stiff bumpy wind and cold weather. However, the fliers all turned out with their ships, and a continuous stream of motor cars viewed the meet. It ran from 10 A.M. to 5:30 P.M., and there is no doubt fine times would have been established if there had been better flying weather. The longest time established was over three minutes, made by Robert Jacobson.

Contestants should not forget the Scripps Howard Junior Air Races, which will take place in Akron, Ohio, from August 30th to September 2nd. The contest is open to all model builders. $2,500 in prizes and cash prizes are expected to draw the largest list of entries in its history. Those who wish to enter should write to the National Junior Aviator headquarters, Press Building, Cleveland, Ohio. Full details will then be sent to you.

On July 16th and 17th the Gulf States are about to witness the largest model airplane meet to be held in this section. This meet will take in every phase of model building.

This contest is being sanctioned by the N.A.A., backed by the City of New Orleans and supervised by the Delgado Trade School. It should make a big hit and stimulate interest in the model field. Builders who are interested in entering this contest should write to Mr. Ashley Burt, Delgado Trades School, 615 City Park Avenue, New Orleans, Louisiana.

Bob VanBuskick of 121 South Alcott, Denver, Colorado, sends us news from his vicinity. He says:

"I suppose you think we have died out here, but don't let the silence fool you. Every Sunday morning we have a contest at 'our gas field.' Each entrant pays 25c and contributions of fans and spectators are accepted. The money is divided between the first two winners. The contests are run under N.A.A. rules, 1/16 ounce of fuel per pound of weight being used. George Crose, N.A.A. Contest Director and members of the Junior Chamber of Commerce and Exchange Club sponsor the meets.

"The winning times have been very good. The best time, 26 minutes, 25-1/5 seconds, made a month ago by Roland Fischer, won him the duration trophy from Maxwell Bassett. The following Sunday Roland made a flight of eight minutes. Ty McMillan won this meet with a flight of over thirteen minutes. Mr. Rike made a flight of nearly nine minutes. On this same day Ronney Hockmuth lost his Brown powered 'Miss Philadelphia' on a trial flight with 1/4 ounce of fuel. It has not been found as yet.

"Two weeks ago there were 2000 spec-

SEPTEMBER ISSUE MODEL AIRPLANE NEWS WILL CARRY A FULL ACCOUNT OF "THE NATIONALS."

THREE (hundred) WISE MEN

300 Young men are enrolled now at CURTISS-WRIGHT TECH training for their future

YOU must train for your future

The Untrained Man Hasn't A Chance — The completely trained man has all the odds in his favor—you can enjoy the good things of life provided you are properly prepared—Curtiss-Wright Tech's great name, prestige and long years of experience guarantees you the finest training in the world. Because of Curtiss-Wright Tech's distinguished reputation and years of experience in successfully training young men for aeronautical careers, there is a constant waiting list of employers for Curtiss-Wright Tech graduates. Consequently there is no indefinite period after graduation when you will be "looking for a job." *You will start earning at once.* Your Curtiss-Wright Tech training will insure your future prosperity since you will have the necessary preparation to command higher salaried positions and win rapid advancement. Curtiss-Wright Tech's two major courses, *Aeronautical Engineering* and *Master Mechanic*, are complete career courses with all non-essentials eliminated. These courses are carefully planned to train you in advance for the highest position you ever expect to occupy. Train in the heart of the aircraft industry in Sunny Southern California, on famous Grand Central Air Terminal, a three million dollar airport. Study the coupon below, select the course you want and mail this handy coupon today for full information. Don't train and you will be a failure—Train with Curtiss-Wright Tech and be a success.

BE WISE—PROTECT YOUR FUTURE

MAIL TODAY! | DON'T DELAY

CURTISS-WRIGHT TECHNICAL INSTITUTE
Grand Central Air Terminal, Glendale, Calif.
Attention, Major C. C. Moseley, President
Sir: Without obligation please send me catalog and information on the courses I have checked.

MAJOR CAREER COURSES
○ AERONAUTICAL ENGINEERING ○ MASTER MECHANICS

SUPPLEMENTARY COURSES
○ POST GRADUATE ENGINEERING ○ AIRCRAFT SHEET METAL ○ HOME STUDY DRAFTSMAN

NAME _____ Age _____ Date I Plan to Enroll _____
ADDRESS _____ CITY _____ STATE _____

CURTISS-WRIGHT TECHNICAL INSTITUTE
GRAND CENTRAL AIR TERMINAL
GLENDALE (LOS ANGELES) CALIFORNIA

1938 MODEL AERONAUTICS YEAR BOOK

HONEST!

The Book is Ready

● On April 27th, we were faced with a problem: Close the book with 160 pages and leave out valuable data and plans. Or, extend the schedule and include the much needed extra 32 pages. We included the 32 pages. The YEAR BOOK now has 192 pages and 112 plans. The greatest collection of model aeronautic facts ever assembled between two covers!

● Why this decision? The YEAR BOOKS will be read and pored over long time after we answer to the call of "Grandpa." A month is very minute in comparison with years and years. We feel that it is our duty to record the present for the future, even though our monetary profit is smaller because of increase in editorial and production costs. The price of the book is still $1.00.

● We wish to thank all of you who have been patient with us. By the time you read this, your copy should be on hand, and the waiting deemed worthwhile. We ordered 10,000 copies so that there will be no shortage or waste of time in second reprinting.

● If you are still without it, or never had the fortune to read one, order your copy today and find out why it is awaited so impatiently and read to shreds before the year is over.

Price $1.00 Postpaid. Hard Cover $1.50 P.P.

Model Aeronautics Publications

83 East 10th Street New York, N. Y.

1938 MODEL AERONAUTICS YEAR BOOK

THE CHALLENGER!

Specifications—68" Wingspread, Weight 3 lbs.

Reports are coming in of flights ranging from 5 to 14 min. with a 20 second motor run.

The CHALLENGER climbs 700 ft. per min. and has a gliding angle of 15 to 1. New features include a crash proof motormount and new type instantly accessible battery box. Any ⅛ or ⅙ h.p. motor may easily be installed. Complete kit of highest grade materials including full size plans, finished prop., ready cut wing and tail ribs, pt. dope and glue, 2½ pts. Berryloid colored dope, inflatable airwheels, ignition equipment, extra balsa, etc..... **$6.75**

Kit minus airwheels $5.25; kit minus airwheels and liquids $3.95.

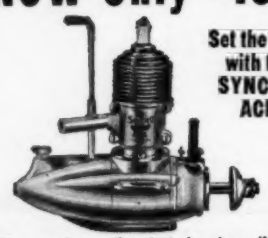
All prices p.p. in U.S.A.

Write for more information.

V. K. MODEL AIRPLANES

7304 Main Street Williamsville, N. Y.

NOW Only $13.75

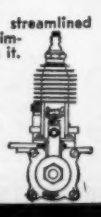


Set the Pace with the SYNCRO ACE

The modern, time-tested, streamlined power plant, with all 1938 improvements. Your dealer has it.

SYNCRO "BEE" NOW READY

Only ½" bore; ⅝" stroke. Approx. weight, 4 oz. It's a honey! Only $12.50, at your dealer.



SYNCRO DEVICES, Inc.
523 Boydell Bldg., Detroit, Mich.

tators. There had been no publicity at all for this day's meet, although now there is a program by Howard Chamberlin on radio station KLZ at 4:40 P.M. every Friday, which is devoted to model airplane activities."

C. E. O'Reilly, secretary of the Canadian Gas Model Club has sent us a report of activities of this organization. Club headquarters are located at 815 Gerrard Street East, Toronto, Ontario, Canada. Mr. O'Reilly says:

"A little news from Canada is long overdue, so here's some gossip about the Canadian Gas Model Club's recent activity. Winter and early spring Sunday morning try-outs culminated in the first official contest of the year on Sunday, May 22nd. Held privately at the deHavilland of Canada field, this event was well attended by thirty models. Fine weather prevailed, giving the fellows every chance in their competition for the H. F. Hebert Trophy, a donation to the club. Flying was conducted under the 1/16 oz./lb. ruling with a maximum of three official flights, and timers were restricted to a 200 foot radius from point of take-off. The top time of the day was established when Cliff O'Reilly's model flew from sight of the naked eye in 9 min., 38-2/5 sec., as officially clocked. This flight, however, lasted 18 minutes, as seen with the aid of binoculars, and ended without any damage 3-1/2 miles distant. Rivaling times of Don Jacobs (out-of-sight 7 min., 32-3/10 sec.), F. McMullen (5 min., 8-2/10 sec.) and Ray Hunter (4 min., 10 sec.) took the respective prizes, consisting of supply house credit slips. The prize-winning models were, in order, Flying Quaker (5-1/4 lbs.), Buccaneer (5-1/2 lbs.), Miss America (4-3/4 lbs.) and an original low-wing (2 lbs.).

"The winning time of 9 min., 38-2/5 sec., is believed, to date, to be the longest in Canada on the 1/16 oz. ruling. This contest constituted more or less of a 'warm-up' for the T. Eaton Co. contest held on June 4th in Toronto.

"Our club is constantly growing and has many prospective members, with an average turn-out to meetings of 45 to 50.

The second annual Gas Model Air Meet, sanctioned by the N.A.A., will be held at the Allentown Bethlehem Airport, Allentown, Pennsylvania on Sunday, July 31st. There will be no entry fee. The two events are Time Flights and Endurance Flights. The meet begins at 1:00 P.M., Eastern Daylight Saving Time. All entries should be filed with Meet Director, W. N. J. Wieand, 1231 Emmett Street, Allentown, Pa., not later than Wednesday, July 27th. The Lehigh Aeronautical Society and Lehigh County Adult Education and Recreation Program are co-sponsors.

"Now make a three point landing . . . pull back the stick slowly but steadily."

BOOK REVIEW

New Practical Aerodynamics Book Just Published By Our Old Friend, Willis L. Nye

Unquestionably model builders who have read MODEL AIRPLANE NEWS know that Mr. Willis Nye is an eminent authority on facts concerning aviation. Model builders have been waiting for a book on practical aerodynamics which could be readily understood and not require the knowledge of expert engineering to comprehend the complicated language and formulas. Willis Nye has written such a book, entitled "Practical Aerodynamics."

All those who wish to attain an added store of information of this kind, or who wish to supplement knowledge which they may be acquiring from engineering courses, should get this book and read it thoroughly. It contains a wealth of information, presented in such a way that it can be understood easily. In brief, it contains all the data and material which is required to design a complete airplane, from start to finish.

In other words, it deals with a practical example and not merely with inapplicable theory. The book is complete with drawings, diagrams, graphs and tables. Where ever there is doubt as to the ability of the reader to comprehend an explanation a practical solution is given. The book also contains information concerning the latest developments in aircraft design.

Designing Your Gas Model "Prop"

(Continued from page 27)

peller efficiency. When gasoline engines are used to generate power, the revolutions per minute delivered, or the power of the motor, cannot be changed. This must be taken as a constant factor.

In this fact lies the heart of the difference between rubber power models and gas models. The design of the propeller of rubber powered planes is governed by the performance (rate of climb) desired and the aerodynamic characteristics of the plane on which it is to be mounted. The number of propeller revolutions per minute may be regulated as required by changing the number of rubber strands in the motor.

The design of a propeller for a gas model is determined by the normal running speed of the engine and the normal flying speed of the plane. The performance will be proportional to the power available at normal engine speed.

It can be said without reservation that thought and care applied to the design of the gas model propeller will produce a greater increase in performance than the application of these qualities to any other

LIVE IN OR NEAR
NEW YORK CITY?
THEN MAKE
POLK'S MODEL CRAFT HOBBIES INC.
YOUR MODEL HEADQUARTERS
First with the latest in gas engines, kits and supplies. Everything you need. Really the most complete Model shop in the country.
POLK'S FOR POWER PLANTS
421 Seventh Ave. (33rd St. Entr.) N.Y.C.

NOW You Can Have a Real *STARTER* For Your GAS MODEL . . . For Only $3.00

We don't have to tell you model fans what an important invention the CADET STARTER is. You know that! So we're telling you it IS available! Starts your engine with SPARK and MIXTURE in running position. Simple. Foolproof. Spring torsion cranks engine while you hold model with other hand. BE THE FIRST TO HAVE ONE! See your dealer TODAY or write for free literature!

BASIC PATENTS have been applied for covering the CADET STARTER. All infringements will be prosecuted.

DEALERS! Write Immediately!

THE CADET STARTER

MAIL TODAY!

Gentlemen: My dealer can't supply me. Enclosed is $3.00 for one CADET STARTER.

NAME .....

ADDRESS .....CITY .....

STATE .....(Please print plainly)

CADET MODEL CO.

6311 San Fernando Road, Glendale, Calif.

part of the plane. The vital question then is how to proceed in order to be certain that the propeller is designed correctly when it is attached to the plane and ready for business.

Insomuch as many model fans are interested in knowing how to create an efficient propeller, rather than understanding thoroughly the theory involved in the design, the first part of this discussion will be devoted to giving basic rules and a practical system of design procedure. A simple system of propeller construction then will be explained, after which an analysis of the theory and reasons underlying the design of propellers will be given for the more ardent and mathematically inclined enthusiasts.

Factors That Influence Design

The only difference in the design of one propeller from another is the difference in the value of the various factors that characterize a propeller. It is important therefore to know what factors a propeller embodies and how they should vary with the dynamic characteristics of the motor and the plane on which this particular propeller is to be used.

The design factors of a gas model propeller are the same as a rubber driven propeller. However their relative values are different in the two cases. They are: 1. Diameter; 2. Pitch; 3. Blade Angle; 4. Blade area; 5. The airfoil cross section used on the blades; 6. Propeller revolutions per minute; 7. The shape of the blades; 8. The number of blades. The factor of *blade area* may be subdivided into two other factors; blade width and length. The propeller diameter is equal to twice the blade length.

Blade Width-Diameter Ratio

The first factor to consider is the correct proportion of the blade width to the diameter of the propeller. Its value is dependent upon the efficiency developed by various ratios at the pitch required. An average pitch is eight inches. At this pitch a propeller will give great efficiency, if the width of the blade is one-tenth the diameter. A value less than this should not be used when the pitch is eight inches or less. In fact a greater blade width value of one-eighth the diameter is excellent and often preferred. The use of the "narrow toothpick" variety of propeller is not advisable except when the propeller has a high pitch. Of course all propellers are not necessarily of eight inch pitch, and when the pitch has another value the blade width should have another value also.

In order that all propellers of the same diameter may be rotated at the same speed when driven by any given engine, the product of the blade width and the pitch must be constant. Thus when the pitch is greater than eight inches, the blade width should be correspondingly less. For instance, when the pitch is twelve inches, the width should be (0.075) D, or 7-1/2% of the diameter calculating on a basis of (W_B=1/10 D), for a pitch of eight inches.

A table is shown below which gives correct blade width for various diameters and pitches, based on blade width ratios of (W_B=1/10 D) and (W_B=1/8 D) for a pitch of eight inches.

Table Of Diameter-Blade Width Ratios For Various Pitch Values

PITCH	6	8	10	12	16	20
Max. W_B Width Values	D/6	D/8	D/10	D/12	D/16	D/20
Min. W_B Width Values	D/7.5	D/10	D/12.5	D/15	D/20	D/25

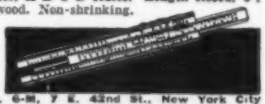
Use Upper Column Values When Propellers Of Comparatively Small Diameters Are Desired

Values that appear in the upper column should be used when you wish a propeller of the smallest possible diameter on a particular plane. Values in the lower column should be used whenever it is possible to use a large diameter propeller on the plane. Whenever the pitch is 75% of the diameter or more, use the minimum blade width values, unless there is insufficient clearance between the propeller tips and the ground.

MANHEIM POCKET SLIDE RULE

Polished stainless steel back frame, flexible scale slide, glass hairline runner. A B C D scales. Length closed, 6". No celluloid—no wood. Non-shrinking.

Accuracy guaranteed. In genuine leather case with instruction booklet. Only $1.00 postpaid.



SEVAN CO., Dept. 6-M, 7 E. 42nd St., New York City

!VALUES!

"FAR IN EXCESS OF OUR PRICES"

FREE ON ORDERS of $1.00 or More

Choice of One of These Special Offers

No. 1 Celluloid Motor (1) any size listed. 5 Sheets Jap. Tissue.

No. 2 Two any size Prop. Blocks (6) 1/16x1¼x15 Bamboo, 30 Shredded and 2 pair any size Birch Wheels.

36" GRADE A BALSA STRIPS

1/16x1/16, 100, .10
1/16x1/8 35 for .10
1/16x3/16, 18, .10
1/16x¼ 15 for .10
1/16x⅜ 5 for .10
3/32x3/32 30, .10
⅛x⅛ 30 for .10
⅛x3/16 15 for .10
⅛x¼ 10 for .10
3/16x3/16 8, .10
¼x¼ 6 for .10
¼x⅜ 4 for .10
¼x½ 3 for .10
½x½ 2 for .10

36" BALSA SHEET

1/32x2 2 for .05
1/16x2 2 for .05
3/32x2 1 for .03
⅛x2 3 for .10
3/16x2 1 for .05
¼x2 1 for .05
½x2 1 for .09

BALSA PROP BLOCKS

⅛x¾x5 8 for .05
⅛x¾x6 7 for .05
⅜x1x7 4 for .05
⅝x1x8 3 for .05
⅜x1¼x10 2, .05
⅜x1¼x12 5c ea.
1x1½x12 4c ea.
1x1½x15 6c ea.

18" BALSA PLANK

1x1 .05
1x1½ .09
1x2 .16
1x3 .15
2x2 .18
2x6 .39

18" lengths of Balsa may be had for half price of 36".

—CEMENT—

DOPE

1 oz. Bottle .04
2 oz. Bottle .08

THINNER

1 oz. Bottle .04
2 oz. Bottle .08

CELU. MOTORS

1½" .09
2" .13
2½" .15
3" .17

BROWN RUBBER

⅛", .18 ft. .05
3/16" 12 ft. .05

TISSUE "A.A."

All Colors 3 for .05
Silver 1 for .04

STRAIGHT WIRE

.020, .028, .034, 6 ft. for .03

BAMBOO

Shredded 36 for .05
1/16x¼x15, 7 for .05

REED

1/32" 1/16" ⅛" Diam. 5 ft. for .02

WASHERS

⅛"—¼" 12 for .01

THRUST BEARINGS

Small .01
Large, 2 for .03

PLASTIC BALSA

1 oz. Bottle .04
2 oz. Bottle .08

BUSHINGS

Large ⅛" 4 for .01
Small 1/16" 5 for .01

RUBBER LUBRICANT

Large Bottle .10

COLORED DOPE

Any Color .06 oz.

SCRAP BALSA

Large Bundle, All Useable 35c each

MACHINE CUT PROPELLERS

5", each .04
6", each .04
7", each .05
8", each .06
9", each .07
10", each .08
12", each .10

WHEELS (PR.)

Blr. Bal. Cel.
½" .01 .03
⅝" .02 .04 .05
1" .03 .05 .07
1¼" .04 .06 .09
1½" .07 .09 .15

STEEL PINS

Large package .05

DEALERS— CLUBS

Send For Special Prices

ORDERING INSTRUCTIONS—Cash or Money Order. No checks—no stamps—no C.O.D. All orders over $1.50 sent prepaid; under $1.50 add 10%. Foreign add 20% on all orders.

GAS SUPPLIES

BALSA Specially Selected

All hard unless otherwise specified. For Five Foot lengths double 36" prices. Sizes from ¼" sq. on. No Gas Orders less than $1.00. Add 15% for Packing and Postage on all Orders.

MOTORS (All Motors Sent Prepaid)

BROWN JR. Ohlsson, $18.50
Model D, $10.00 Trojan, 18.50
Model C, 17.00 (Uprights)
Model B, 21.50 Mighty Midget, 9.50
Gwin Aero, 12.00

Special Gas Model Cement, Dope Pint..... .55

Send for Additional Prices on Gas Supplies and Accessories

TRIANGLE MODEL SUPPLY CO.

32-57 38th St. Dept. F. 2 Long Island City, N. Y.

PROPELLERS

- ANY QUANTITY
- FINEST BALSA
- TRUE PITCH
- 4" to 16" DIAMETER

Manufacturers of model airplane kits as well as model builders, are now assured of an unfailing source of supply for propellers of any size or quantity. Comet's Supply Division is prepared to produce Balsa propellers of absolutely true pitch, cut to the highest precision standards, on short notice. Volume production assures lowest prices. Let us quote you on your needs.

WRITE on Letterhead for FREE SAMPLES and LOW PRICES

COMET TIMER FOR GAS MODELS!

Amazing new timer. Simple, foolproof. Adjustable 10 to 50 seconds. Ready to install—each timer complete with directions in attractive carton. Weight ⅛th ounce. Patent pending. Write for further information. Price only.....50c

SUPPLY DIVISION

COMET MODEL AIRPLANE and SUPPLY COMPANY

2509 CERMAK RD., CHICAGO, ILL.
688 BROADWAY, NEW YORK

The model builder may follow this general rule with excellent results: *Make the maximum width of the propeller blades equal to one-tenth (1 10) the propeller diameter*, or ($W_B = D/10$). This relationship may be used for average pitches; i.e., seven to ten inches.

As the correct pitch that your propeller should have will not be known until further on in our calculations, it is impossible to determine at this juncture the actual proportion of diameter to blade width. However when designing your propeller it may be assumed that the pitch is eight inches. The proportion of diameter to blade width may be taken on this basis in order to calculate the actual diameter and blade width required for an engine of any particular power. Later, when the pitch has been determined, the correct blade width may be calculated, for the product of the blade width times the pitch should be of constant value for any given diameter and power applied. If a D/W_B ratio of (10) is chosen, (see table No. 1) for an eight inch pitch, any other ratio shown in the same column opposite the corresponding pitch value in the extreme left hand column, will absorb the same power from the engine as the ratio of $D/W_B = 10$ for an eight inch pitch. This is true of course only when the R.P.M. of the engine is the same.

How to Determine the Diameter

The next step is to determine the correct value of the diameter. With any given D/W_B ratio and pitch, the diameter must have a definite value in order that the engine will be able to turn the propeller at the required number of revolutions per minute. In the case of nearly all engines on the market, the normal running speed is 4,000 R.P.M.

By means of the chart shown at the bottom of page No. 27 the correct diameter of your propeller may be selected. If you examine the chart you will see two heavy lines, marked (A) and (B). The points on the (A) line represent propellers with a D/W_B ratio of (8). In order to determine the correct diameter to use for an engine of any particular power, when the D/W_B ratio is (8), first select the power or cubic inch displacement of the engine to be used, in the power values at the left of the graph. Then follow horizontally across the graph to the right, until the horizontal line intersects the (A) curve. From this point of intersection pass down vertically to the bottom of the graph and read the diameter indicated by the figures of the scale at the graph's lower edge.

Points in the (B) line represent propellers with a D/W_B ratio of (10) when the pitch is eight inches. That is, the diameter is ten times the width of the blade. The correct diameter to give a propeller with this ratio, for any given engine power, may be determined by following the same procedure as described above for D/W_B ratios of (8).

As an example, let us suppose that a propeller is to be designed for a 1/5 (0.2) horsepower engine. Such engines have, as a rule, a piston displacement of 0.6 cubic inches. In order to establish a basis for the final calculation of pitch and blade width, the quantities of diameter and blade width may be established for a pitch of eight inches, on which value the chart is based.

The first step is to find the horizontal line on the chart that is designated by a cubic inch piston displacement value, (Cu), of (0.6), at the left edge of the chart. Follow this line to the right until it intersects the (B) curve. Then by means of the diameter scale at the bottom of the chart, determine the value of the vertical diameter line that passes through the point of intersection of the ($Cu = 0.6$) line with curve (B). You will see that the point of intersection lies on the vertical line representing a diameter of fifteen inches.

Thus we see that a propeller for a 1/5 hp. motor should have a diameter of fifteen inches when the pitch is eight inches and the blade width is 1/10 the diameter. Under these conditions the blade width (W_B) should be 1.5 inches ($W_B = D/10 = 15/10 = 1.5$). This W_B value may be verified by the dotted curves running upward to the right across the face of the graph. Any one of these lines pass through points of equal blade width for a given pitch value. For instance, line No. 4 passes through the point on the (B) curve which represents the propeller values of 1/5 hp. and fifteen inch diameter that have been established as correct. Follow this curve over to the table at the right side of the graph. In the horizontal column under a pitch value of eight inches, you will see the blade width value of 1.5 inches. All points on line No. 4, thus indicate a blade width value of 1.5 inches for a pitch of eight inches. If it is found later (when the correct pitch is determined through calculation) that the propeller should have a pitch value of ten inches in order to fly the plane correctly, then the width of the blade should be 1.2 inches. This value is indicated in the table in the line No. 4 column under a pitch value of ten.

In this manner the characteristics of the propeller are established according to specifications of pitch, diameter and blade width, yet with such values assigned to these quantities that the engine will turn the propeller at the normal engine speed of 4,000 R.P.M.

The light solid lines marked (a) are lines of equal blade area for propellers of eight inches pitch. You will notice that the point representing the propeller being designed as an example, lies half-way between the two lines ($a = 18$ sq. in.) and ($a = 16$ sq. in.). This indicates that the blade area of the propeller is 17 square inches. This fact is not important at the moment, but will have a bearing on the calculation of performance later in our discussion.

Next month the explanation of important facts about propeller design will be continued.

CLASSIFIED DIRECTORY

Advertise in this directory for quick profitable results! Rate 10c per word. Minimum 20 words. REMITTANCES MUST ACCOMPANY ALL ADS FOR THIS DIRECTORY. Advertisements for the Sept. issue must be in by July 10.

MODEL AIRPLANES—KITS—SUPPLIES

GASOLINE powered model airplane kits, new and rebuilt motors and supplies. Free list. Carl A. K. Eldredge, Jr., Haddonfield, N.J.

DEALERS, Clubs, Schools: Send for low, complete wholesale list, including gas model supplies. Save money. Model Airplane Utility, 3307 New Utrecht Ave., Brooklyn, N.Y.

BROWN AERO RUBBER—Hodgman Rubber Company, 261 Fifth Avenue, New York City. Chicago office: 412 South Wells Street. Dealers and manufacturers only.

SAVINGS on model airplane supplies. Write for free price list. Dealers, Clubs. Our discounts mean real profits. Waterbury Model Builders Supply, 131 Cherry Street, Waterbury, Connecticut.

GAS model supplies direct to you from manufacturer. Savings from 50 to 100% guaranteed. Complete list on kits and motors. Write for information on how to get a 5 ply laminated propeller Free. Gas Model Supplies, 298 Rogers Ave., Brooklyn, N.Y.

MEGOW'S 30" Monocoupe, Stinson, Arrow Sport, Aeronca, Waterman, Fairey Battle—80c each postpaid, with one 20" Guillow's dry kit free. Megow's and Guillow's 12", 15", 16", 20" Flying Models, 2 for 35c, 6 for $1.00 postpaid. G. L. Young, 2405 Second Ave. No., Birmingham, Alabama.

NEW Designs! Consistent Fliers! Extremely realistic though designed primarily for flyability. 36" low wing, high wing, or cabin. Complete kits, with free-wheeling propeller, 60c each. Mars Models, 600 No. Solano, Albuquerque, New Mexico.

30c, Gas Model Props, any length, 30c; 4 for $1.00. Birch, Mahogany, or Gumwood. Excellent type and workmanship. C. Smith, 4645 Elm Court, Denver, Colorado.

GAS Model Propeller Blanks, Mexican Mahogany. These blanks are drilled and have correct taper. 12" to 16"—20c each p.p. Tru-Pitch Propeller Works, 306 Bradford St., Brooklyn, N.Y.

GAS Model Specialties, 314 Second North, Syracuse, N.Y. —Free—Order our latest Super-Catalogue today. Extra Special—55 second timer (regularly $2.00) only $1.65 p.p.

PROPS: Gas model, 10" to 14", ideal tapered pitch. 25c each plus postage or at your dealer. Don's Flying Circus, 1445 Cherry Avenue, Long Beach, Calif.

GASOLINE Engines a Specialty. Now, send 10c for latest catalogue containing over 1650 items and two pages for Log Records. Ruggeri's, 340 East 73rd St., New York City.

DELUX Propellers: Machine pitched, no guess work, complete even to imitated brass tips, $2.00—2 for $3.50 postpaid. Midget Aircraft Co., Box 22, Montpelier, Vt.

JOBBERS-Dealers, wanted to handle a new line of giant 5-foot flyers and endurance models $1.00 sellers. Posters and details of our attractive discounts will be cheerfully sent to you on request. Capitol Aircraft Supplies Co., 298 Rogers Ave., Brooklyn, N.Y.

Buy Where Your Model Money Gets Most

in quality—features—and performance

DOOLITTLE'S GB SUPERSPORTSTER

Span 12⅛". Sug. col.: white, red scalloping.
Dry Kit **D-27**, only..... **65c**
Dry Kit **SF-27** (Span 18⅝") **$1.95**

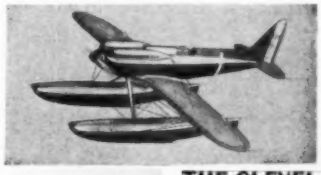
Cleveland Models win more prizes, more honors than any other line of models in the world. They're tops!

Big Summer Sport

with both Model Airplane and Model R. R. Kits. The C-D's featured here are specially selected for this time of the year. Don't delay getting the ones you want—order today.

HUGHES
14 Cylinder
RACER

Speed and fishing performance are designed right in this clever realistic model of the Hughes Racer. It's a peach of a miniature of the 350 m.p.h. super speed flyer—and one that every speed enthusiast will certainly want to build. Retractable landing gear—marvelous streamlining. Don't delay getting it. Dry Kit **R-54**, complete (except liquids) postfree, only..... **95c**



SUBMARINE S6.B RACER

Won the permanent possession of the Schnieder Trophy for Great Britain. Model well suited for exhibition when carefully built. Will take off water and fly beautifully at a high speed. Span 22½". Should be colored silver and blue.
Dry Kit **SF-19**..... **$1.95**

Doug. O-38 Observation
Snappy National Guard Trainer. Span 20". Sug. col.: yellow and olive drab or blue.
Kit **D-43**, only..... **$1.10**
Dry Kit **SF-43** (Span 30") **$2.95**

THE CLEVELAND AMPHIBION
AN AMPHIBION NEVER YET EQUALLED

The "perfect" kit for warm weather fun, especially for vacations. Will take off water as easily as water rolls from a duck's back and that's mighty fast. Long steady flights are always to be expected. Twin motors. Span 28". Will also R.O.G. as the wheels are quickly dropped. Without liquids.
Kit **R-X5001**, only..... **65c**

TURNER'S W. WMS.
Very popular. Span 13". Sug. col.: all gold.
Dry Kit **D-48**, only..... **65c**
Dry Kit **SF-48** (Span 19½") **$2.35.**

CURTISS HAWK P6-E
Famous U. S. fighter. Span 15¾". Sug. col.: yellow, O. drab (or blue) blk. and white.
Kit **D-21**, only..... **95c**
Dry Kit **SF-21**, **$2.50**

C-D Gas Models are the class of the Gas Model flying world

DE HAVILLAND "COMET"

High speed flyer, pulled by 2 powerful little motors. Extraordinarily beautiful. Red and white. Span 22". Kit absolutely complete (but NO LIQUIDS).
Kit **D-51**, post free, only..... **$1.35**

C-D RAILROAD KITS

Ideal for Summer Model Work. All to C-D 7/8" Gage

Kits are complete (but no cements or touch-up colors) with sides, tops and ends printed in authentic colors and lettering. By simply employing working couplers, detaching dummy trucks and replacing with actual working trucks, "REP" (cars only) models will "operate."

RL-1 PRR Switcher 0-6-0 ..... .65
RL-2 C&O Pacific 4-6-2 ..... .85
RS-1 Hiawatha 4-4-2 ..... .95
RS-2 Hia. Tap-Diner ..... .75
RS-3 Hia. Coach ..... .75
RS-4 Hia. Beaver Tail ..... .75

BOX CARS
RB-1 NYC—40 ft. steel.. .45
RB-2 B&O—40 ft. steel.. .45
RB-3 B&O—40 ft. wood .45
RB-4 Rock Island 40' wood ..... .45
RB-5 Wabash—40' wood .45
RB-6 SP 40' wood furn. .45
RB-8 T&P 40' wood auto .45
RB-9 AT&SF 40' wood.. .45
RB-11 Union Pac.—50' steel ..... .55
RB-12 AT&SF 50' st. auto ..... .55

CABOOSE
RC-1 PRR type N-5..... .45

FLAT CARS
RF-1 C&NW 40' 50 ton .25
RF-2 PRR 40' 50 ton .25
RF-3 B&M 40' 55 ton .25
RF-4 L&N 40' 50 ton .25

GONDOLA TYPE CARS
RG-1 L&N 41' 50 ton .35
RG-2 NYC 41' 50 ton .35
RG-3 MC 41' 55 ton.. .35
RG-4 T&P 41' 50 ton .35
RG-5 PRR 65' 70 ton mill type gondola... .55

55 T. TWIN HOPPER CARS
RH-1 CCC&StL RR..... .40
RH-2 Missouri Pac. RR .40
RH-3 Southern Railroad .40
RH-4 Illinois Central RR .40

8000 GAL. TANK CARS
RT-1 Texaco—TCX (wh.) .35
RT-2 NATX (black)..... .35
RT-3 Sinclair—SDOX..... .35
RT-4 Gulf—CRCX (blk.) .35

"BROWN JR."
We stock four Brown Jr. motors, available at **$10.00, $15.00, $17.50** and **$21.50.** Order these directly from us (Engines not sold to dealers). Props. 12" laminated each **95c.**

Build This Authentic *Gas Powered* STINSON RELIANT

A real beauty in flight or on the ground. Plenty of wing area for use with motors of any size under 1". Especially recommended for experimental radio controlled jobs of which many have already been made. Span 82". This kit comes without liquids, wheels and wheel shoes and of course without the power unit, as is the general practice. Order **GP-66** postfree..... **$8.50**

Kit of extra parts to complete model (except Power Unit) $4.00. Add 85c if you wish 3¼ M&M's instead of wood wheels.

HI-SPEED FAIRY "BATTLE"

Trim, sleek, swift—being a design that plane designers throughout the world are keenly watching. 1000 of these are being built for England's Fighting and Bombing Fleet. "Rep" model is careful reproduction of prototype—flies fast, long and with exceptional grace. All silver. Kit **R-67**, complete postfree, only..... **65c**

ORDERING INSTRUCTIONS: All direct orders subject to our regular shipping terms. Send check or M.O. (cash at own risk). No C.O.D.'s. To U.S. Possessions, Canada and British Isles, add 10% extra; all other countries, 20%, except those which have a "transit charge" then add 40%. Be sure to include 10c for our Summer Catalog if you don't have a copy.

GR. LAKES SPORT TRAINER

Span 13¾". Very pretty. Sug. col.: orange and cream. Dry Kit **D-1**, only..... **65c**
Dry Kit **SF-1** (span 20") **$1.95**

AERONCA C-3 SPORT

Easy for beginners, span 18". Sug. col.: red and silver.
Dry Kit **D-40**, only..... **65c**
¾" Dry Kit **SF-40** (Span 27")..... **$1.95**
With Pontoons, 35c extra

DEALERS!

The C-D line offers an unrivaled breadth of sales and profit opportunities. Kit of model planes and R.R. projects to suit every taste and purse. Don't delay letting C-D's build a real model business that keeps bringing profits in all year 'round. Thousands of other items too. Start today. Write for discounts, literature and details.

Cleveland Model & Supply Co., Inc.

4508-B60 Lorain Ave. ★ ★ ★ ★ ★ Cleveland, Ohio, U. S. A.

Send 10c for C-D Catalog

WORLD'S PIONEER *Gas Model Builder* *Designs* MEGOW'S *New Sensation!*

This amazing new Megow model has just been designed by Maxwell Bassett, National Champion and widely-known builder of world's record gas-powered model airplanes. Small . . . easy to build, transport and fly . . . and sensationally low in price, everyone can now have his own gas-powered model.

$3.95 *plus 20c post.*

$50 for a NAME!

Name this new Megow Gas-Powered Model designed by Maxwell Bassett and WIN A PRIZE! $50 in cash will be paid to the first person to send in the name finally chosen.

10 Additional Prizes

$5.00 each will also be awarded for the 10 next-best suggestions. When more than one contestant suggests the same name, award will go to the first presented according to postmark. Contest closes August 31st. See your dealer for full details.

With a completely finished, ready-to-use propeller, special rubber wheels and all metal parts die-cut, this new Megow wonder is the most complete model in its field, and can be built in a fraction of the usual time. Due to its size, light weight and design, it is practically crackup-proof, and has been tested in practical flying for over nine months. Wingspan 48 in. Weight 19½ ounces. Uses any small motor with approximately ⅝ in. stroke and bore.

CONDOR MIDGET MOTOR

Specially adapted to models averaging about 48" wingspan . . . models which, due to light weight, are practically crackup-proof. A beautiful little high compression job, the most powerful and economical in its class. Precision-built. Light weight coil operating on penlite cells. **$18.50**

(See Megow catalog for full details on all the leading motors.)

GIANT FLYING MODELS

HOWARD DGA8
$1.25 plus 15c postage

Big, colorful, sleek outline scale models with motor-hum device, designed for long, stable flights and flat glides! For size, light weight, strong construction and design they reach a "new high". In addition to the two shown here, there's also a WACO at $2.00; a 60" STINSON RELIANT at $1.50; MONOCOUPE, $1.25; TAYLOR CUB, $1.00; FAIRCHILD RANGER, $1.00; & AERONCA K at $1.00.

REARWIN SPEEDSTER
$1.00 plus 15c post.

See your dealer—or any kit will be mailed for 15c additional for postage.

AIRPLANES, SHIPS, RAILROADS

Send for Catalog Today!

Send 5c for the largest, most complete catalog we have ever issued. 94 pages, illustrating scores of model airplanes, ships . . . and the NEW MEGOW HO GAUGE RAILROADS. Also ready-made parts and supplies for all model-builders.

MEGOW'S

Dept. MA, Howard and Oxford Streets, Philadelphia, Pa.
or 217 N. Desplaines Street, Chicago, Ill.
or Great Western Merc. Co., 718 Mission St., San Francisco

Aer-O-Kits—Sheffield, England. A. Warnaar, Voorburg, Holland American Products, Tienen-Tirlemont, Belg. Eskader, Stockholm, Sweden. K-Dee Pty., Ltd., Sydney, Australia

Please send me

- ☐ BASSETT'S GAS-POWERED MODEL
- ☐ QUAKER FLASH
- ☐ REARWIN
- ☐ HOWARD DGA8
- ☐ WACO
- ☐ STINSON RELIANT
- ☐ MONOCOUPE 90A
- ☐ TAYLOR CUB
- ☐ FAIRCHILD RANGER
- ☐ AERONCA K
- ☐ CATALOG

Money Order for $_____ is enclosed

*Name*_____

*Address*_____

*City*_____ *State*_____